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CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1264

[CPSC Docket No. 2011-0074]

Safety Standard Addressing Blade-Contact Injuries on Table Saws

AGENCY: Consumer Product Safety Commission.

ACTION: Supplemental notice of proposed rulemaking; notice of opportunity for oral presentation of comments.

SUMMARY: The U.S. Consumer Product Safety Commission (Commission or CPSC) has determined preliminarily that there may be an unreasonable risk of blade-contact injuries associated with table saws. To address this hazard, the Commission proposes a rule under the Consumer Product Safety Act (CPSA) that would establish a performance standard that requires table saws to limit the depth of cut to no more than 3.5 millimeters when a test probe, acting as surrogate for a human finger or other body part, approaches the spinning blade at a rate of 1 meter per second (m/s). The Commission is providing an opportunity for interested parties to present comments on this supplemental notice of proposed rulemaking (SNPR).

DATES: *Deadline for Written Comments:* Written comments must be received by [INSERT DATE THAT IS 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. *Deadline for Request to Present Oral Comments:* Any person interested in making an oral presentation must send an e-mail indicating this intent to the Office of the Secretary at cpsc-os@cpsc.gov by [INSERT DATE THAT IS 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: *Written Comments:* You may submit written comments in response to the proposed rule, identified by Docket No. CPSC-2011-0074, by any of the following methods:

Electronic Submissions: Submit electronic comments to the Federal eRulemaking Portal at: http://www.regulations.gov. Follow the instructions for submitting comments. Do not submit

through this website: confidential business information, trade secret information, or other sensitive or protected information that you do not want to be available to the public. The Commission typically does not accept comments submitted by e-mail, except as described below.

Mail/hand delivery/courier/written submissions: CPSC encourages you to submit electronic comments by using the Federal eRulemaking Portal. You may, however, submit comments by mail/hand delivery/courier to: Office of the Secretary, Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814; telephone (301) 504-7923.

Instructions: All submissions received must include the agency name and docket number for this document. CPSC may post all comments without change, including any personal identifiers, contact information, or other personal information provided, to: http://www.regulations.gov. If you wish to submit confidential business information, trade secret information, or other sensitive or protected information that you do not want to be available to the public, you may submit such comments by mail, hand delivery, or courier, or you may email them to cpsc-os@cpsc.gov.

Docket SNPR: For access to the docket to read background documents or comments received, go to: http://www.regulations.gov, insert docket number CPSC-2011-0074 into the "Search" box, and follow the prompts.

FOR FURTHER INFORMATION CONTACT: Caroleene Paul, Directorate for Engineering Sciences, U.S. Consumer Product Safety Commission, 5 Research Place, Rockville, MD 20850; telephone (301) 987-2225; fax (301) 869-0294; e-mail cpaul@cpsc.gov.

SUPPLEMENTARY INFORMATION:

I. Background[1]

On April 15, 2003, Stephen Gass, David Fanning, and James Fulmer, *et al.* (petitioners) requested that the CPSC require performance standards for a system to reduce or prevent injuries

[1] On October 18, 2023, the Commission voted 3-1 to publish this supplemental notice of proposed rulemaking. Commissioners Feldman and Trumka issued statements in connection with their votes available at:

associated with contact with the blade of a table saw. The petitioners were associated with SawStop, LLC, and its parent company, SD3, LLC (collectively, SawStop). On October 11, 2011, the Commission published an advance notice of proposed rulemaking (ANPR) to consider whether there may be an unreasonable risk of blade-contact injuries associated with table saws. 76 FR 62678. The ANPR began a rulemaking proceeding under the CPSA. The Commission received approximately 1,600 public comments.

On May 12, 2017, the Commission published a notice of proposed rulemaking (NPR) to address blade-contact injuries associated with table saws. 82 FR 22190. The proposed rule stated that it would limit the depth of cut of a table saw to 3.5 mm or less when a test probe, acting as surrogate for a human finger or other body part, contacts the spinning blade at an approach rate of 1 m/s. CPSC staff estimated that the proposed rule would prevent or mitigate the severity of 54,800 medically treated blade-contact injuries annually, and that the proposed rule's aggregate net benefits on an annual basis could range from about $625 million to about $2.3 billion.[2] The Commission received written comments and oral presentations concerning the proposed rule. The written comments are available at https://www.regulations.gov/document/CPSC-2011-0074-1154/comment, and a video of the public hearing is available on the Commission's YouTube channel at https://www.youtube.com/watch?v=BgPmKkGIILc. Section VIII of this preamble contains a summary of the significant issues raised by the comments submitted, and the Commission's assessment of those issues.

Following publication of the NPR, CPSC staff completed a Special Study of table saw injuries that occurred in 2017.[3] On December 4, 2018, the Commission announced the

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https://www.cpsc.gov/s3fs-public/Comm-Mtg-Min-TableSaws-SupplementalNPR-Decisional.pdf?VersionId=JizUyNt5p7KDR_svKn2O6ql9VkHIR2E8.

[2] *See* Commission Briefing Package: Proposed Rule: Safety Standard Addressing Blade-Contact Injuries on Table Saws, available at https://www.cpsc.gov/content/Commission-Briefing-Package-Proposed-Rule-Safety-Standard-Addressing-Blade-Contact-Injuries-on-Table-Saws.

[3] Table Saw Blade-Contact Injuries Special Study Report, available at https://www.cpsc.gov/s3fs-public/Draft%20Notice%20of%20Availability%20Table%20Saw%20Blade%20Contact%20Injuries%20Special%20Study%20Report%20-%202017%20-%20November%2014%202018.pdf.

availability of and sought comment on the study. 83 FR 62561. The Commission received written comments on the study results from the public, which are available at regulations.gov, under docket number CPSC-2011-0074.

In September 2019, CPSC staff submitted a Table Saw Update to the Commission with staff's analysis of NEISS data through 2018, including a discussion of the 2017 Special Study.[4] The results of the 2017 Special Study indicated that there might be a lower risk of injury on table saws equipped with a modular blade guard system that met the latest voluntary standards, compared to older table saws equipped with a traditional blade guard system. However, a 15-year trend analysis (from 2004 to 2018) of table saw injuries reported in the September 2019 update showed no reduction in table saw injuries from 2010 to 2018, despite the fact that a voluntary standard that became effective in 2010 required new table saws to be equipped with modular blade guard systems.[5]

This SNPR analyzes updated incident data through 2021. The data confirm the 2019 analysis and suggest no reduction in table saw injuries despite the fact that the relevant voluntary standard has required table saws to include modular blade guards since 2010.

Also since publication of the NPR in 2017, staff is aware of several changes to the table saw market that include:

- introduction of a compact table saw with active injury mitigation (AIM) capabilities;
- introduction of a Preventative Contact System (PCS) on a commercial sliding table panel saw;
- introduction of cordless, battery-powered bench saws by at least two manufacturers;
- change in ownership of patents related to SawStop AIM technology, with the acquisition of SawStop, LLC, by TTS Tooltechnic Systems Holding AG (TTS); and
- expiration of two patents related to SawStop AIM technology.

[4] Available at: https://www.cpsc.gov/s3fs-public/Table%20Saw%20Update%202019.pdf.
[5] *Id.* at 27-32.

The Commission is issuing this supplemental notice of proposed rulemaking based on staff's analysis of newly available incident data, evaluation of newly available products, and other market information that did not exist at the time of the 2017 NPR. As discussed in greater detail in section VII of this preamble, the revised proposed rule is generally consistent with the rule proposed in the 2017 NPR, but includes an updated definition of the term "table saw," a more precise description of the proposed performance requirement, and a revised anti-stockpiling provision.

The Commission now expects that the proposed rule would prevent or mitigate the severity of an estimated 49,176 injuries treated in hospital emergency departments or other medical settings per year. The Commission further estimates that net benefits would range from approximately $1.28 billion to $2.32 billion per year.

II. Statutory Authority

This supplemental notice of proposed rulemaking is authorized by the CPSA. 15 U.S.C. 2051-2084. Section 7 of the CPSA authorizes the Commission to promulgate a mandatory consumer product safety standard that sets forth performance or labeling requirements for a consumer product if such requirements are reasonably necessary to prevent or reduce an unreasonable risk of injury. 15 U.S.C. 2056(a). Section 9 of the CPSA specifies the procedure that the Commission must follow to issue a consumer product safety standard under section 7.

Pursuant to section 9(f)(1) of the CPSA, before promulgating a consumer product safety rule, the Commission must consider, and make appropriate findings to be included in the rule, on the following issues:

- The degree and nature of the risk of injury that the rule is designed to eliminate or reduce;
- The approximate number of consumer products subject to the rule;
- The need of the public for the products subject to the rule and the probable effect the rule will have on the utility, cost, or availability of such products; and

- The means to achieve the objective of the rule while minimizing adverse effects on competition, manufacturing, and commercial practices.

15 U.S.C. 2058(f)(1).

Under section 9(f)(3) of the CPSA, to issue a final rule, the Commission must find that the rule is "reasonably necessary to eliminate or reduce an unreasonable risk of injury associated with such product" and that issuing the rule is in the public interest. 15 U.S.C. 2058(f)(3)(A)&(B). Additionally, if a voluntary standard addressing the risk of injury has been adopted and implemented, the Commission must find that the voluntary standard is not likely to eliminate or adequately reduce the risk of injury, or substantial compliance with the voluntary standard is unlikely. The Commission also must find that expected benefits of the rule bear a reasonable relationship to its costs, and that the rule imposes the least burdensome requirements that prevent or adequately reduce the risk of injury for which the rule is being promulgated. 15 U.S.C. 2058(f)(3)(D)-(F).

III. The Product

A. Types of Table Saws

Table saws are stationary power tools used for the straight sawing of wood and other materials. The basic design of a table saw consists of a motor-driven saw blade that protrudes through a flat table surface. To make a cut, the operator places the workpiece on the table and, using a rip fence or miter gauge as a guide, pushes the workpiece into the blade (see Figure 1).

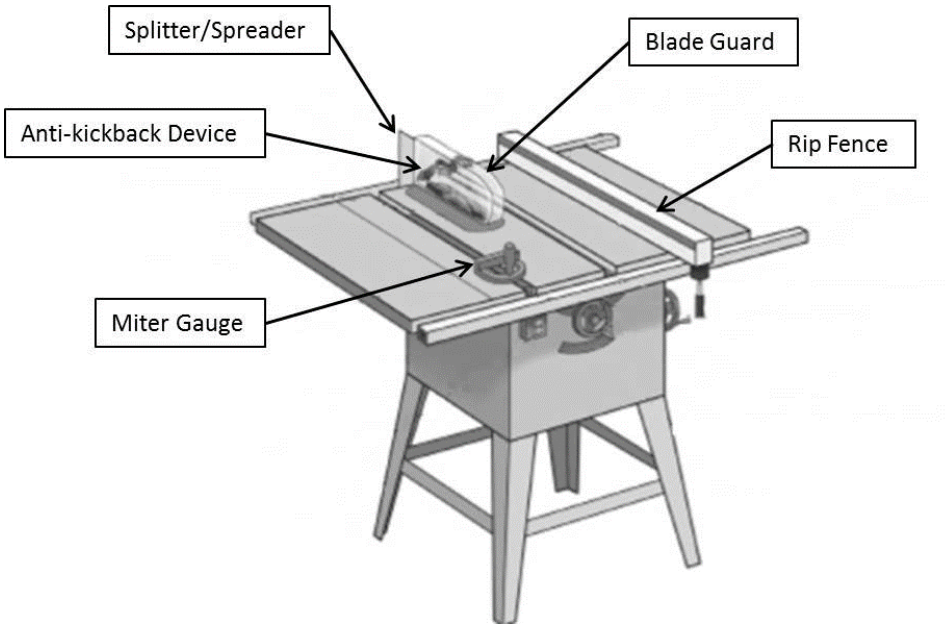


Figure 1. Typical table saw components

Table saws generally fall into three product types**:** bench saws, contractor saws, and cabinet saws. Although there are no exact distinctions among these types of saws, the categories are generally based on size, weight, portability, power transmission, and price. Some industry participants use additional specialized descriptions, such as "jobsite saws," "hybrid saws," and "sliding saws."

Bench saws are intended to be transportable, so they tend to be small, lightweight, and relatively inexpensive. In recent years, bench saw designs have evolved to include saws with larger and heavier-duty table surfaces, with some attached to a folding stand with wheels to maintain mobility. These larger portable saws on wheeled stands are commonly called "jobsite saws" because they are capable of heavier-duty work but still portable enough to move to work sites. Bench saws are generally powered using standard house voltage (110-120 volts), use universal motors,[6] drive the saw blade through gears, and range in weight from 34 pounds to 133 pounds. The universal motor and gear drive produce the high decibel noise and vibration that are distinctive characteristics of bench saws. Prices for bench saws range from $129 to as much as

[6] A universal motor runs on AC or DC power and uses current and electromagnets to rotate a shaft. Universal motors are lightweight, compact, and cheaper to produce than induction motors. An induction motor runs on AC power, which is used to create a rotating magnetic field to induce torque on the output shaft. Induction motors are quieter and last longer, but are also more expensive.

$1,499 for a high-end model. Based on available information, bench saws account for approximately 79 percent of the table saw market by volume.

Since the 2017 NPR was published, cordless battery-powered bench saws have been introduced widely to the table saw market. The first cordless table saw came to market in 2016, and at least three other brands have been introduced in the last few years. Cordless table saws typically run on lithium-ion batteries that range from 18 volts to 60 volts and are equipped with 8.25-inch blades with thinner kerfs to reduce friction while cutting. Prices for battery-powered bench saws range from $299 to $599 for the tool only, and the accompanying battery prices range from $50 to $150.

Contractor saws are larger and more powerful than bench saws, and range in weight from approximately 200 to 400 pounds. Although most contractor saws are stationary, a mobile base can be added to the frame. Contractor saws are often used in home workshops as a less expensive alternative to stationary cabinet saws. Contractor saws generally use a 10-inch blade, are powered using standard house voltage, use induction motors, and are belt driven. Compared to a bench saw, the induction motor and belt drive result in a table saw that produces less vibration and is quieter, more accurate, able to cut thicker pieces of wood, and more durable. Prices for contractor saws range from around $599 to $2,000, and contractor saws account for approximately 15 percent of the table saw market by volume of units sold.

Cabinet saws—also referred to as stationary saws—are the largest, heaviest, and most powerful of the three table saw types, and are typically the highest grade saw found in home woodworking shops. Cabinet saws generally use a 10-inch blade, are powered using 220-240 volts, use a 1.75-5 horsepower or stronger motor enclosed in a cabinet, are belt driven, and weigh from around 300 pounds to 1,000 pounds. Components in cabinet saws are designed for heavy use and durability, and the greater weight further reduces vibration so that cuts are smoother and more accurate. Cabinet saws have an average product life of more than 20 years, and prices

range from approximately $1,399 to $5,000. Based on available information, cabinet saws account for approximately 6 percent of the table saw market by unit volume.

B. Standard Safety Devices

In the 2017 NPR, the Commission described common safety devices on table saws that are designed to reduce contact between the saw blade and the operator. 82 FR at 22192. As described in the NPR, these devices generally fall into two categories: (1) blade guards, and (2) kickback-prevention devices including splitters, riving knives, and anti-kickback pawls.

The riving knife and modular blade guard represent the latest safety measures that have been incorporated into the voluntary standards for table saws. Blade guards surround the exposed blade and function as a physical barrier between the blade and the operator. Riving knives are curved metal plates that physically prevent the two halves of a cut workpiece from moving back towards each other and punching the splitting blade, which could cause the operator to lose control of the workpiece. The Power Tool Institute (PTI), the industry trade group that represents manufacturers of consumer-grade table saws, has estimated that in 2017, 80 percent of bench saws, 33 percent of contractor saws, and 25 percent of cabinet table saws sold were equipped with modular blade guards and riving knives.[7]

C. Active Injury Mitigation (AIM) Technology

The 2017 NPR described an AIM system that detects imminent or actual human contact with the table saw blade and then performs an action to prevent or mitigate the severity of the injury. The NPR described two AIM systems available at the time: the SawStop system and the Bosch REAXX system. *See* 82 FR at 22193-94. On July 16, 2015, SawStop filed with the U.S. International Trade Commission (ITC) a complaint against Bosch for patent infringement, and requested that the ITC order U.S. Customs to exclude Bosch REAXX saws from entering the U.S. market. On January 27, 2017, the ITC issued an order prohibiting Bosch from importing

[7] PTI comment (CPSC-2011-0074-1343) in response to notification of availability of 2017 Special Study. Retrieved from: https://www.regulations.gov/comment/CPSC-2011-0074-1343.

and selling Bosch REAXX saws, based on a determination that Bosch had infringed on two SawStop patents. *See* 82 FR 9075.

Since the 2017 NPR was published, CPSC staff has become aware of another AIM technology called the preventative contact system (PCS), developed by the Felder Group. The PCS detects motion by using a capacitive field around the blade, which can detect movement before a body part contacts the blade. Marketing of the system indicates that its detection system works for fast and slow body part movement and reacts to impending blade contact by retracting the blade below the table surface in milliseconds. Retraction of the blade is achieved by reversing the polarity of two strong electro-magnets that hold the blade arbor in place. Two magnets with the same magnetic poles will repel each other, and this action moves the saw blade below the tabletop fast enough to prevent injury to a body part that would otherwise contact the rotating saw blade. The PCS system is available as an option on Felder's most expensive sliding table saw.

IV. Risk of Injury

A. Description of Hazard

In 2017, CPSC staff conducted a Special Study of emergency department-treated table saw blade-contact injuries, in order to collect data on saw types, incident details, and injury characteristics that are otherwise not available in the standard National Electronic Injury Surveillance System (NEISS) data collections. The 2017 Study provided detailed information based on a snapshot of incidents that occurred in a single year. In 2017, there were an estimated 26,500 table saw blade-contact, emergency department-treated injuries. Of these, an estimated 25,600 injuries (96.4 percent) involved the finger. The estimated number of injuries for each of the most common diagnoses in blade-contact injuries were: 16,100 lacerations (60.9 percent), 5,500 fractures (20.6 percent), and 2,800 amputations (10.7 percent).

B. NEISS Trend Analysis

In the 2017 NPR briefing package, CPSC staff assessed trends for table saw blade-contact injuries reported through NEISS and concluded that there was no discernible change in the number or types of blade-contact injuries associated with table saws annually from 2004 to 2015. No statistically significant trend was detected in any of the analyses for the number of blade-contact injuries, amputations, hospitalizations, and finger/hand injuries. Staff also conducted a trend analysis to include the rate of injury per 10,000 table saws in use for each year in the analysis. The analysis again showed that there was no discernible change in the risk of injury associated with blade contact related to table saws from 2004 to 2015. *See* Staff NPR Briefing Package at 25-29.

In the 2019 Status Update briefing package, CPSC staff updated the NEISS trend analyses. Staff assessed trends for table saw blade-contact injuries, amputations, hospitalizations, and finger/hand injuries, and concluded once more that there was no discernible change in the number of blade-contact injuries or types of injuries related to table saw blade contact, this time for the period 2004 to 2018.[8] Trend analysis for the rate of injury per 10,000 table saws in use also showed that there was no discernible change in the risk of injury associated with blade contact related to table saws from 2004 to 2018, despite the increasing percentage of saws sold with modular blade guards and riving knives.

For this supplemental NPR, staff performed trend analyses for blade-contact injuries, amputations, hospitalizations, and finger/hand injuries up to 2021. The voluntary standards in place have required modular blade guards since the publishing of UL 987, 7th edition, which had an effective date of January 2010. The date ranges for the trend analyses cover a timespan when an increasing proportion of table saws in use were equipped with modular blade guards (2010 to 2021), as well as the approximate period during which table saws equipped with traditional blade guards were no longer being produced (2015 to 2021). Table 1 provides the estimated number of

[8] Table Saw Update 2019. Available at: https://www.cpsc.gov/s3fs-public/Table%20Saw%20Update%202019.pdf.

emergency department-treated injuries associated with table saw blade contact from 2010 through 2021.

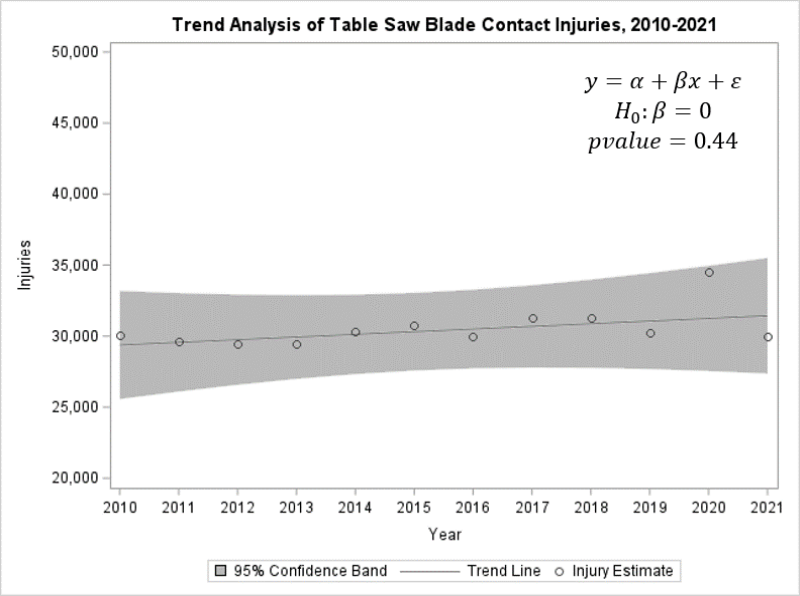
Table 1. NEISS Estimates for Table Saw Blade-Contact Injuries, 2010-2021

Year	Table Saw Blade Contact Injury Estimates			
	N	Estimate	CV	95% Confidence Interval
2021	655	30,000	0.10	24,100-35,900
2020	689	34,600	0.10	27,800-41,300
2019	627	30,300	0.09	24,900-35,700
2018	649	31,300	0.09	25,500-37,100
2017	654	31,300	0.09	25,800-36,700
2016	646	30,000	0.09	25,000-35,000
2015	642	30,800	0.09	25,100-36,500
2014	631	30,300	0.08	25,300-35,300
2013	662	29,500	0.09	24,500-34,500
2012	648	29,500	0.09	24,100-34,900
2011	362	29,600	0.09	24,300-35,000
2010	657	30,100	0.10	24,000-36,200

Source: U.S. CPSC: NEISS

Figure 2 provides the estimated blade-contact injuries associated with table saws and the fitted trend line with a 95 percent confidence band for the fitted line from 2010 through 2021. The p-value associated with the slope of the fitted line is 0.44, which indicates that there is not a statistically significant trend in blade-contact injuries associated with table saws over this timeframe.

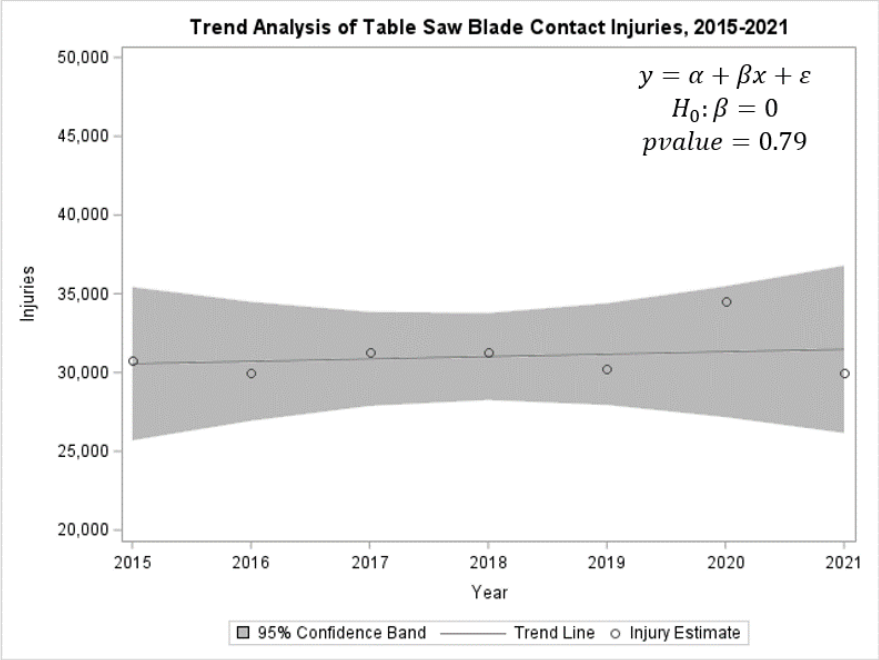
Figure 2. Trend Analysis of Table Saw Blade-Contact-Related Injuries, 2010-2021



Source: U.S. CPSC: NEISS

Figure 3 provides the estimated blade-contact injuries associated with table saws and the fitted trend line with a 95 percent confidence band for the fitted line from 2015 through 2021. The p-value associated with the slope of the fitted line is 0.79, which indicates that there is not a statistically significant trend in blade-contact injuries associated with table saws over this timeframe, despite the market shift during this time to table saws with modular blade guards and riving knives.

Figure 3. Trend Analysis of Table Saw Blade-Contact-Related Injuries, 2015-2021



Source: U.S. CPSC: NEISS

To assess any changes over time in the severity of table saw blade-contact injuries, CPSC staff performed trend analyses for blade-contact amputations, hospitalizations (including patients who were treated and admitted to the same hospital, as well as treated and transferred to a different hospital), and finger/hand injuries from 2010-2021 and 2015-2021. No statistically significant trend was detected in any of these analyses. Table 2 provides the total estimated number of blade-contact injuries from 2010 through 2021 for amputations, hospitalizations, and finger/hand injuries from blade contact, and expresses those numbers as a percentage of all estimated blade-contact injuries.

Table 2. NEISS Injury Estimates for Table Saw Blade-Contact Amputations, Hospitalizations, and Finger/Hand Injuries, 2010-2021

	Amputations		Hospitalizations		Finger/Hand Injuries	
Year	*Estimate (95% CI)*	*% of blade contact injuries*	*Estimate (95% CI)*	*% of blade contact injuries*	*Estimate (95% CI)*	*% of blade contact injuries*
2021	3,400 (2,200—4,500)	11.2%	2,000 (1,200—2,900)	6.7%	29,100 (23,400—34,800)	97.1%
2020	4,700 (3,200—6,300)	13.6%	3,200 (2,100—4,300)	9.3%	34,100 (27,400—40,800)	98.8%
2019	4,700 (3,200—6,100)	15.4%	2,400 (1,500—3,200)	7.8%	29,700 (24,300—35,100)	98.3%
2018	4,400 (3,100—5,600)	13.9%	3,100 (2,100—4,200)	10.0%	30,600 (24,900—36,400)	97.8%
2017	4,800 (3,200—6,400)	15.4%	2,800 (1,700—3,900)	8.9%	30,400 (25,100—35,800)	97.4%
2016	4,000 (2,600—5,300)	13.2%	3,500 (2,100—5,000)	11.8%	29,600 (24,600—34,500)	98.5%
2015	4,700 (3,100—6,300)	15.2%	3,800 (2,300—5,300)	12.3%	30,500 (24,900—36,100)	99.1%
2014	4,000 (2,400—5,500)	13.1%	3,100 (1,700—4,400)	10.1%	29,400 (24,600—34,300)	97.2%
2013	3,400 (2,300—4,600)	11.7%	3,000 (1,800—4,200)	10.2%	29,200 (24,300—34,200)	99.2%
2012	4,100 (2,700—5,600)	13.9%	2,900 (1,300—4,400)	9.8%	29,100 (23,700—34,400)	98.7%
2011	3,900 (2,700—5,100)	13.2%	2,900 (1,900—3,900)	9.9%	29,400 (24,200—34,700)	99.3%
2010	3,500 (2,500—4,500)	11.6%	2,800 (2,000—3,600)	9.2%	29,800 (23,700—36,000)	99.2%

Source: U.S. CPSC: NEISS

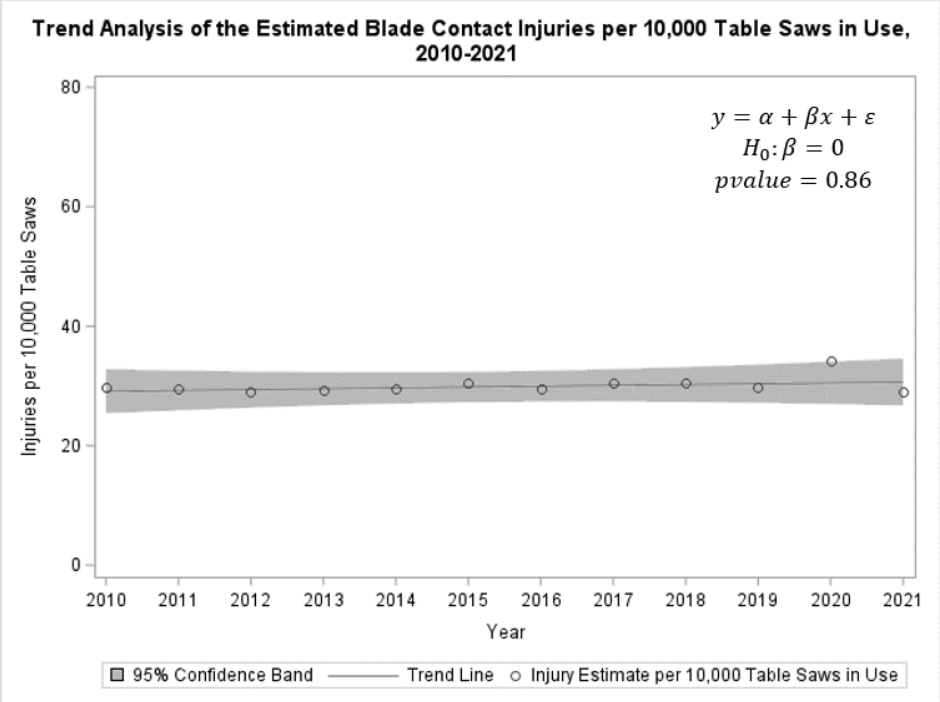
Table 3 provides an estimate of blade-contact injuries per 10,000 table saws in use for each year in the analysis. Figure 4 provides the trend analysis results for that data. The p-value associated with the slope of the fitted line is 0.86, which indicates that there is not a statistically significant trend. When limiting the trend analysis to the years 2015-2021, the p-value associated with the slope of the fitted line becomes 0.17, which also indicates the nonexistence of a statistically significant trend. Possible changes in usage patterns of table saws were not considered in these analyses.

Table 3. Estimated Table Saw Blade-Contact Injuries per 10,000 Table Saws in Use, 2010-2021

Year	Table Saw Blade Contact Injury Estimates		Estimated Number of Table Saws in Use (in 10,000s)*	Estimates** of Table Saw Blade Contact Injury per 10,000 Table Saws in Use	
	Blade Contact Injury Estimate	95% Confidence Interval	Table Saws in Use Estimate	Estimate	95% Confidence Interval
2021	30,000	24,100-35,900	1003.9	29.9	24.0-35.7
2020	34,600	27,800-41,300	883.6	39.1	31.5-46.8
2019	30,300	24,900-35,700	849.8	35.6	29.3-42.0
2018	31,300	25,500-37,100	828.6	37.8	30.8-44.8
2017	31,300	25,800-36,700	820.3	38.1	31.5-44.7
2016	30,000	25,000-35,000	822.2	36.5	30.4-42.6
2015	30,800	25,100-36,500	827.4	37.2	30.3-44.1
2014	30,300	25,300-35,300	831.3	36.4	30.4-42.5
2013	29,500	24,500-34,500	838.2	35.2	29.3-41.1
2012	29,500	24,100-34,900	847.4	34.8	28.4-41.1
2011	29,600	24,300-35,000	855.6	34.7	28.4-40.9
2010	30,100	24,000-36,200	866.5	34.7	27.7-41.8

* CPSC's Directorate for Economics provided the estimated numbers of table saws in use for this analysis.
** Estimates are calculated from the exact number of injuries point estimate, not the rounded estimate.

Figure 4. Blade-Contact Injuries per 10,000 Table Saws in Use Trend Analysis, 2010-2021



Source: U.S. CPSC: NEISS

Based on the foregoing analyses by CPSC staff, the Commission concludes that there has been no discernible change in the pattern of blade-contact injuries or types of injuries related to table saw blade contact, despite the transition of the market to modular blade guards and riving knives since 2010 and the phasing out of traditional blade guards since 2015.

V. Relevant Existing Standards

A. UL 987 and UL 62841-3-1

Underwriters Laboratories Inc. (UL) published the first edition of UL 987 *Stationary and Fixed Electric Tools* in 1971. The UL 987 standard includes voluntary requirements for cord-connected and permanently connected stationary and light industrial electric tools. UL revised the standard several times, with the 6th edition in 2005 and the 7th edition in 2007 introducing significant changes to the requirements covering blade guard design. The latest 8th edition was published in 2011, with revisions that clarified the requirements for table saws and defined terms specific to table saws.

In 2016, as part of UL's international harmonization goal to adopt international standards, UL published the first edition of UL 62841-3-1, *Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery Part 3-1: Particular Requirements for Transportable Table Saws*. In 2019, UL removed section 43 (Table Saws) from UL 987, leaving UL 62841-3-1 as the current voluntary standard for table saws. UL 62841-3-1 is recognized as an American National Standards Institute (ANSI) standard and contains essentially the same blade guard requirements as UL 987.

Section 19.101 of UL 62841-3-1 specifies that a table saw shall provide "either a saw blade guard mounted to an extended riving knife complying with 19.101.2 or an over-arm saw blade guard complying with 19.101.3." Section 19.101.2 specifies that the guard may consist of independent side and top barriers and must have openings that provide visibility of the blade's cutting edge. This modular guard attaches to the riving knife and shall provide coverage over the saw blade as determined by a probe test. Section 19.103 specifies that a table saw shall be equipped with a riving knife that is located behind the blade at a height below the saw blade that allows the riving knife to pass freely through the cutting groove of the piece being cut. Section 21.106.3 specifies that an antikickback device attached to the riving knife shall be easily removable and function independently from the blade guard.

B. Active Injury Mitigation

Since 2004, table saws have been available in the U.S. market with AIM capabilities that mitigate injuries when a hand or finger makes contact with a rotating saw blade. In February 2015, UL defined an "active injury mitigation" system as an active system that serves to mitigate or prevent injury from exposure to a rotating saw blade. At a basic level, an AIM system for table saws must perform two functions: detect contact or imminent contact between the rotating saw blade and a human body part, and react to mitigate injury. Detection can be achieved by sensing electrical or thermal properties of the human body, or visually sensing and tracking the human body.

In 2015 and 2016, UL balloted proposals to add AIM system requirements for table saws to UL 987 and UL 62841-3-1, respectively. The ballots proposed performance requirements that limited the depth of cut to a probe simulating a human finger to 4 mm or less when introduced to an operating saw blade at an approach rate of 1 m/s. UL has identified a 4 mm cut from the surface of the skin as the quantitative threshold separating simple and complex lacerations in a human finger.[9] Simple lacerations can be managed at emergency departments with little expertise or by simple home care because these cuts generally heal without complications, while complex lacerations require more significant medical attention. Although CPSC staff expressed support for both ballots,[10,11] both ballots failed, and AIM requirements were not adopted.

In July 2017, UL announced the availability of its *Recommended Practice for Determining the Depth of Cut on a Test Probe Contacting the Spinning Blade of a Table Saw*, UL RP 3002. The Recommended Practice is available as a test procedure for manufacturers or independent third parties to evaluate AIM performance. UL stated in its comment to the 2017 NPR that it chose to publish this Recommended Practice because it believes the addition of

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[9] Table Saw Hazard Study on Finger Injuries Due to Blade Contact, *UL Research Report*, Jan. 2014. Available at: http://library.ul.com/wp-content/uploads/sites/40/2015/02/UL_WhitePapers_Tablesaw_V11.pdf.
[10] Letter from Caroleene Paul, CPSC, to John Stimitz, UL, dated March 24, 2015. Retrieved from: https://www.cpsc.gov/s3fs-public/CPSClettertoULcommenttoAIMSproposalwenclosures.pdf.
[11] Letter from Caroleene Paul, CPSC, to John Stimitz ,UL, dated March 11, 2016. Retrieved from: https://www.cpsc.gov/s3fs-public/CPSClettertoULcommenttoAIMS.pdf.

active technology on table saws will further reduce the incidence of blade-contact injuries and represent a marked increase in the safety of these devices.[12]

C. Adequacy of Voluntary Standard in Addressing Injuries

In January 2010, the voluntary standard's modular blade guard requirement took effect. Under this requirement, all table saws sold in the United States shall be equipped with a system consisting of a modular guard and antikickback device attached to a riving knife. In the NPR, the Commission noted staff's conclusion that, while the modular blade guard system was an improvement over the traditional blade guard system, a guard is only effective if used, and incident data and survey data indicate users remove modular blade guards for similar reasons (such as improved visibility or to make certain types of cuts) that they had removed traditional blade guards.

In its comments on the 2017 NPR,[13] PTI reported that its analysis of 299 table saw accidents from 2007 to 2015 indicated that 35 percent of the incidents involved table saws equipped with modular blade guards, and over 50 percent of those users had removed the blade guard prior to being injured. Similarly, staff conducted a Special Study of NEISS table saw incidents that occurred from January to December 2017. A summary of this 2017 Study was provided to the Commission in the Table Saw Update package in 2019. The 2017 Study confirmed that the majority of injuries occur on table saws without a blade guard installed, and that injured users of table saws equipped with modular blade guards removed the blade guard anecdotally at the same rate as injured users of table saws equipped with traditional blade guards. Further, as discussed in section IV of this preamble, CPSC staff assessed trends for table saw blade-contact injuries, amputations, hospitalizations, and finger or hand injuries since 2010, and concluded that there had been no statistically significant change over that time period.

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[12] Comment from Sarah Owen on behalf of UL in response to 2017 NPR. Retrieved from: https://www.regulations.gov/comment/CPSC-2011-0074-1275.

[13] PTI comment (CPSC-2011-0074-1288) in response to 2017 NPR. Retrieved from: https://www.regulations.gov/comment/CPSC-2011-0074-1288.

VI. CPSC Staff Testing of AIM Since the 2017 NPR

CPSC staff has conducted tests on table saws equipped with AIM technology, using the test probe and test method described in Appendix A of Tab A of the 2017 NPR briefing package.[14] Staff used a computer-controlled electromechanical linear actuator to move a probe into the spinning blade of a table saw equipped with AIM technology. Staff conducted tests at varying blade heights and approach rates, tests with the ground of the power plug disconnected; and proof-of-concept evaluations of adding AIM technology to a battery-operated bench saw.

As discussed in section V of this preamble, UL identified the threshold between simple and severe lacerations to the finger as 4 mm from the surface of the skin. Because the test probe represents human flesh beneath the epidermis, staff subtracted the 0.5 mm thickness of the epidermal layer of skin from that 4 mm threshold value to arrive at a maximum allowable depth of cut to the test probe of 3.5 mm.

A. Prior Testing

In Tab A of the 2017 NPR briefing package, CPSC staff presented results of tests in which the test probe was introduced to an operating saw blade on a SawStop JSS-MCA jobsite table saw and a Bosch REAXX jobsite table saw. Both saws were equipped with 10-inch blades and some type of AIM technology. As shown in table 4, the depth of cut for the SawStop table saw tests ranged from 1.5 mm to 2.8 mm, and the depth of cut for the Bosch REAXX table saw tests ranged from 1.8 mm to 2.5 mm.

[14] Available at https://www.cpsc.gov/content/Commission-Briefing-Package-Proposed-Rule-Safety-Standard-Addressing-Blade-Contact-Injuries-on-Table-Saws.

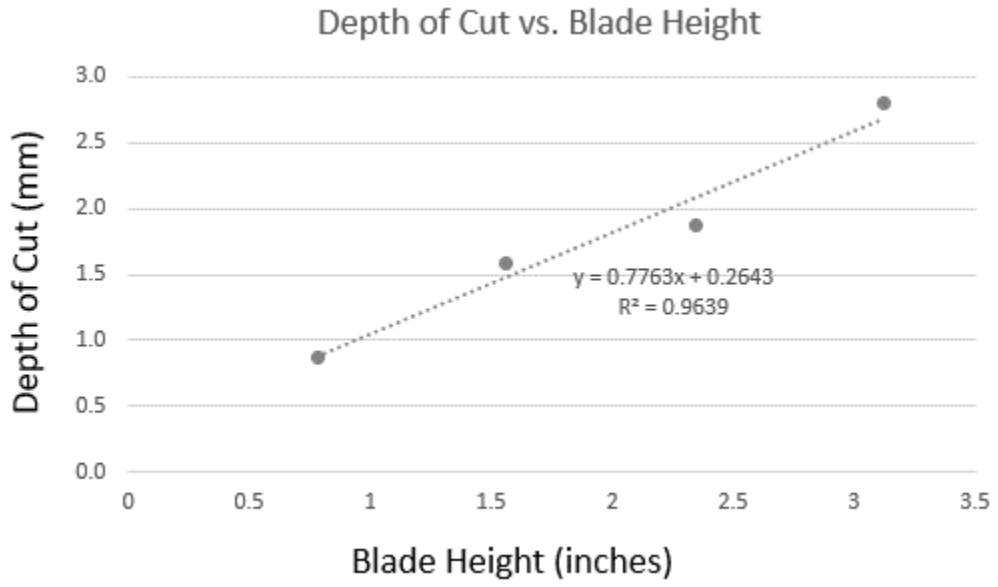
Table 4. Depth of Cut Values for SawStop and Bosch Table Saws

Test Run	Human Body Network (HBN) Capacitance (pF)	Depth of Cut (mm)	
		SawStop	Bosch
1	50	2.3	2.2
2	100	2.8	2.1
3	150	2.5	1.9
4	200	2.5	2.2
5	250	2.7	2.1
6	300	2.1	1.8
7	350	1.5	2.4
8	400	2.1	2.5
9	450	2.7	2.5
10	500	2.6	2.5
11	Short circuit	2.6	2.5

B. Additional Tests at Varying Blade Heights

Staff conducted tests at different blade heights on a SawStop JSS-MCA jobsite saw. As shown in Figure 5, test results indicate a linear relationship between depth of cut to the test probe and blade height. Staff determined the greatest depth of cut occurred when the table saw blade was set at its highest setting. For this reason, the rule proposed in this SNPR specifies that performance must be measured with the saw blade set at its highest setting, with no bevel angle.

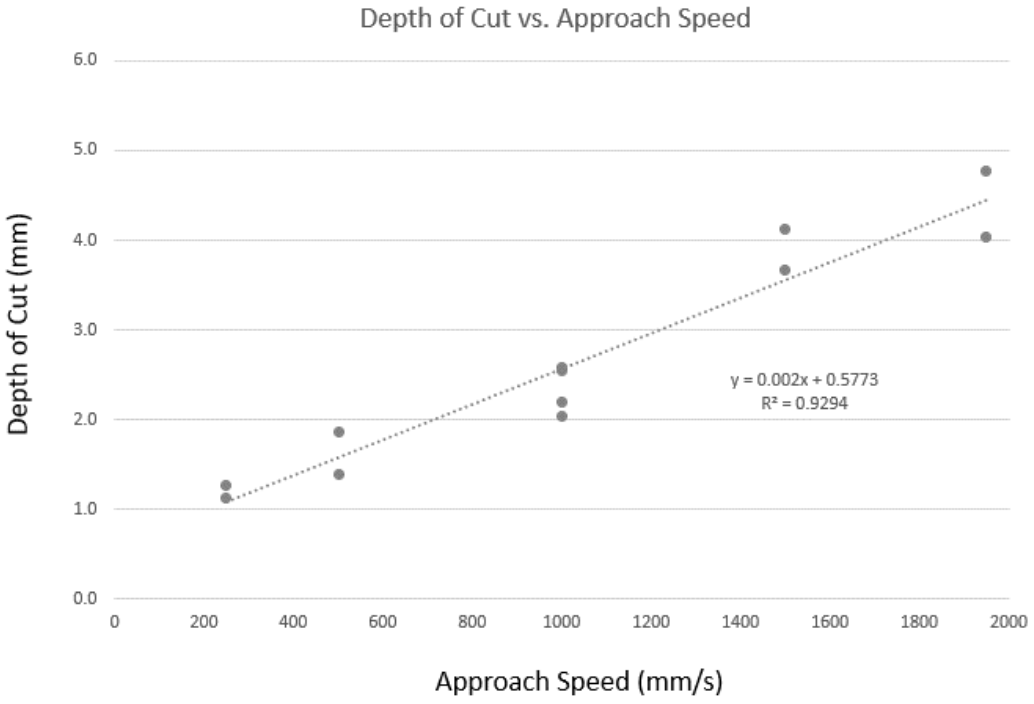
Figure 5. Depth of Cut versus Blade Height (tests conducted on SawStop JSS-MCA jobsite saw)



C. Additional Tests at Varying Approach Speeds

The approach rate of the test probe to the saw blade represents the speed at which a human finger moves toward the saw blade during a blade-contact incident. Staff conducted tests at different approach rates of the probe to the blade on a SawStop JSS-MCA jobsite saw. As shown in Figure 6, test results indicate a linear relationship between depth of cut to the test probe and approach speed. This linear relationship renders testing at multiple approach rates redundant, and the proposed rule in this SNPR thus requires that table saw performance be measured at an approach rate of 1 m/s.

Figure 6. Depth of Cut Versus Approach Speed



D. Additional Tests with Ground Disconnected

CPSC staff conducted tests with the ground plug of the power cord on a SawStop JSS-MCA jobsite saw disconnected. Test results showed no effect on AIM functionality.

E. Additional Tests of SawStop Compact Table Saw

Comments to the ANPR and the 2017 NPR questioned whether AIM technology can be applied to small bench saws. Staff conducted tests with an approach rate of 1 m/s on a SawStop CTS compact table saw, with an HBN capacitance of 50 pF.[15] This saw weighs 68 pounds, is

[15] 50 pF represents the body's minimum self-capacitance, and represents a worst-case scenario in which the table

equipped with a 10-inch blade, and is the smallest, most portable saw SawStop offers. Upon testing, the compact table saw equipped with AIM technology limited the depth of cut to a test probe, when approaching the blade at 1 m/s, to less than 3.5 mm.

F. Additional Tests Demonstrating AIM on Cordless Battery-Powered Bench Saws

Since the 2017 NPR was published, cordless battery-powered table saws have been introduced to the table saw market. Cordless table saws typically are powered by lithium-ion batteries that range from 18 volts to 60 volts and are equipped with 8.25-inch blades with thinner kerfs compared to typical 10-inch blades for corded electric table saws. To evaluate the feasibility of applying AIM technology on a battery-powered bench saw, staff modified a 33-pound battery-powered bench saw equipped with an 8.25-inch blade by adding lightweight aluminum framing. This modification allowed staff to position a standard SawStop 10-inch brake cartridge at a distance that would stop the bench saw's blade if the brake cartridge was activated. The proof-of-concept testing was designed to evaluate the ability of a lightweight battery-powered bench saw to withstand the energy of an AIM system activating, so the testing did not retract the blade; instead, all of the energy required for stopping the blade was absorbed by the brake cartridge and the bench saw's structure. With the table saw on and the blade spinning at full speed, staff remotely activated the brake cartridge and the bench saw's blade came to a complete stop. The bench saw moved approximately 1 inch vertically, but there was no damage to the saw or its table surface. Based on this testing, CPSC staff concluded that a battery-powered bench saw can withstand the reaction energy of an AIM system.

In addition, applying a signal to the saw blade can be achieved by using the bench saw's battery and a voltage reducer to reduce the battery voltage to the voltage required to induce a detection signal on the saw blade. CPSC staff has noted that battery-powered bench saws already use a voltage regulator to maintain voltage within acceptable limits for the table saw to

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saw operator is located in such a way that the effective capacitance is the body's minimum self-capacitance. See Tab A of the 2017 NPR briefing package.

function; therefore, if there is enough voltage to operate the bench saw, there will also be enough voltage to induce a signal on the saw blade.

VII. Proposed Requirement and Changes from 2017 NPR

Based on staff's evaluations of NEISS incident data, testing conducted prior to and subsequent to the publication of the 2017 NPR, and the comments received in response to the NPR and the Special Study as discussed in section VIII of this preamble, the Commission proposes the following revisions to the rule proposed in the 2017 NPR:

- Specifically reference jobsite saws, hybrid saws, sliding saws, and battery-powered saws in the definition of "table saw," to better clarify the scope of the proposed rule and account for terms used by some industry participants;
- Remove the reference to "radial approach rate" from the rule's description of how the test probe must be introduced to the saw blade, and add descriptive language clarifying that movement of the test probe shall be parallel to the saw's table surface, with the center axis of the probe at a height of 15 ± 2 mm above the saw's table surface, as discussed in Response 1 in section VIII of this preamble;
- Require that testing be conducted while the spinning saw blade is at its maximum height setting, as discussed in section VI of this preamble.
- Revise the rule's anti-stockpiling provision to prohibit the manufacture or importation of noncompliant table saws at a rate greater than 115 percent of the rate at which table saws were manufactured or imported during the 12-month period prior to promulgation of the final rule, rather than 120 percent of the rate at which saws were manufactured during any 12-month period in the five years preceding promulgation, to more closely match the growth rate of the table saw market over the last three years.

This SNPR also proposes to change the CFR part number to 1264.

While the proposed rule establishes performance requirements intended to mitigate the risk of injury associated with contacting table saw blades, it does not dictate how table saw manufacturers must meet those requirements. There already are different methods to limit the depth of cut to a test probe or finger. SawStop stops the blade and allows angular momentum to retract it. The Bosch REAXX retracts the blade with an explosive discharge. Since the 2017 NPR was published, a system based on reverse polarity of electromagnets to retract the blade has also been introduced to the market. Furthermore, manufacturers need not use the particular test procedure described in this preamble and in Tab A of the 2017 NPR briefing package, so long as the test method they use effectively assesses compliance with the standard. Other test probes and test methods using a different detection system may be developed to detect human contact with the saw blade and to measure depth of cut.

VIII. Response to Comments

The Commission published the 2017 NPR in the Federal Register on May 12, 2017. The public comment period ended on July 26, 2017. On August 9, 2017, the Commission held a public meeting to hear oral presentations concerning the NPR. CPSC received 437 comments, which can be found at regulations.gov, under docket number CPSC-2011-0074. Approximately 66 of the 437 NPR comments supported developing regulatory standards for table saws. The other commenters generally opposed the rulemaking proceeding. On December 4, 2018, the Commission published a notice of availability of the 2017 Special Study, with comment period ending February 4, 2019. CPSC received 4 comments to the 2017 Special Study, which can also be found at regulations.gov, under docket number CPSC-2011-0074.

In this section, we describe and respond to comments on the 2017 NPR and the 2017 Special Study. We present a summary of comments by topic, followed by the Commission's response.

A. Performance Requirements and Testing Procedure

Comment 1: Bosch and PTI commented on the use of the term "radial" in section 1245.3(b) of the NPR's proposed rule text. Bosch commented that a literal interpretation of that term would allow manufacturers to introduce a probe toward the blade at an angle that is likely to result in a shallower depth of cut, or no cut at all, thus resulting in artificially positive testing results. PTI commented that for a typical 10" diameter blade table saw, advancing the test probe along the tabletop at an approach velocity of 1 m/s would lead to slightly less than 900 mm/s in the radial direction towards the center of the blade.

Response 1: CPSC staff agrees the descriptor "radial" can be misleading. For improved clarity, the rule proposed in this supplemental NPR omits that term from its performance requirement. The rulemaking instead describes a frontal approach to the saw blade, which is adjusted to its highest setting, with the center axis of the test probe parallel to the table saw top surface, 15 ± 2 mm above the table saw top surface, and perpendicular to the direction of approach to the saw blade. See Appendix A to Tab A of the NPR briefing package for an illustrated example of this configuration.

Comment 2: Bosch and PTI commented that the geometry of the test probe specified in rule proposed in the NPR may lead to inappropriately deep cut measurements because the contact area available for charge transfer is less on a square probe than on a cylindrical probe. This limited contact area may delay detection and lead to a deeper depth of cut on the test surrogate than would be experienced by a cylindrical probe that more closely resembles a finger.

Response 2: CPSC staff used a cuboid-shaped test probe made of conductive silicone rubber because the probe had already been developed by UL in its own testing of AIM technology and was readily available. Staff's tests using the square probe resulted in cuts less than 3 mm deep, and the commenter provided no evidence that a cylindrical probe will detect and trigger an AIM system faster than a square probe. In addition, body parts that may contact a saw blade, such as the fingertip, are not always cylindrical.

However, under §§ 1264.3 and 1264.4 of the proposed rule, testers may use a cylindrical probe as proposed by Bosch and PTI, rather than the square or cuboid probe used in UL's test methodology, as long as it possesses characteristics that render it a suitable surrogate for a human finger. The March 2015 UL Research Report referenced in PTI's comment recommends that a surrogate finger possess the following general characteristics:

- Triggering: An ability to trigger the selected safety mechanism upon finger contact with (or in very close proximity to) the blade;
- Clean Cut: Material properties that allow the surrogate finger to exhibit a clean cut upon contact with the blade; and
- Finger Setup Rigidity: The rigidity of the surrogate finger setup should minimize bending during blade contact with a minimum rigidity of 70 kN/m.

Comment 3: Bosch commented that the test probe is not an accurate representation of the human body. Bosch stated that if a test probe were made from pure zinc or tin and connected to Earth through a low-resistance cable, then it would transfer charge better than a connection made to a human being, which could lead to AIM technology performing better in the test lab than in real-world conditions.

Response 3: The test method described in Tab A of the 2017 NPR briefing package is based on triggering a capacitance-based AIM system with a conductive test probe that is coupled to a human body network (HBN), which is a circuit that mimics the human body. The HBN uses a series of capacitors and resisters to replicate the human body's impedance, the property that triggers a capacitance-based AIM system. When the test probe, connected to the HBN, contacts the blade of a table saw equipped with a capacitance-based AIM, the HBN changes the signal on the saw blade and triggers the AIM system. Whether the probe is made from metal (as posited by this comment) or conductive rubber (as used in staff's testing) is not significant, because, based on CPSC staff's testing, the material of the probe has minimal effect on impedance compared to the series combinations of the HBN and especially the series capacitance.

Comment 4: PTI commented that the rule proposed in the NPR is inconsistent with the February 2015 and February 2016 UL ballot proposals, which required testing at variable approach rates, including rates both above and below 1 m/s. PTI suggested that testing at higher approach rates is necessary because higher approach rates result in more severe injuries.

Response 4: As discussed in section VI of this preamble, the results of staff's testing indicate a linear relationship between approach rate and depth of cut. In fact, the UL ballot proposals included approach rates and maximum depth of cuts that had a linear relationship. This linear relationship renders testing at approach rates greater than or less than 1 m/s redundant, as it is expected that higher or lower rates will result in correspondingly more or less severe injuries.

In addition, the available data on approach rates during both kickback and non-kickback-related table saw blade-contact incidents indicate the approach rate is unlikely to exceed 0.368 m/s.[16] Likewise, victim response information from the 2017 Special Study indicates that in the majority of cases, approximately 57 percent, blade contact did not involve the victim's hand being pulled into the blade. Of those cases, 46 percent involved "reaching to do, or for, something," and in 17 percent "the victim's hand was fed into the blade." CPSC staff advises that these descriptors indicate that movement of the operator's hand during blade contact was below an approach rate of 1 m/s.

Comment 5: PTI commented that the Commission's test protocol needs additional specifications to ensure repeatability and reliability.

Response 5: CPSC has not received specific support for PTI's assertion that the test protocol is not repeatable or reliable. On the contrary, staff's testing of four different table saws equipped with AIM technology has shown that the protocols in the test method are sound and repeatable.

[16] Gass, S. (2012). Retrieved from: https://www.regulations.gov/document?D=CPSC-2011-0074-1106.

Comment 6: PTI commented that the test procedure proposed in the NPR is incomplete because it does not specify the required distance between the probe holder and the plane of the saw blade and does not specify the required stiffness of the stabilizing strip supporting the probe. PTI also commented that, due to probe flexing, results are not repeatable.

Response 6: The test procedure intentionally does not prevent testers from using a different probe or testing setup from the one described in Tab A of the NPR briefing package, but instead allows different setups that have a minimum rigidity of 70 kN/m. The tester is at liberty to design the probe holder attachment to the linear actuator to ensure that the probe remains secure within the holder and approaches the saw blade in accordance with the requirements of the rulemaking. Staff's testing has shown that results produced by the test method are repeatable.

B. Effectiveness of Proposed Rule

Comment 7: Bosch commented that AIM-equipped table saws can require a properly grounded outlet, but properly grounded outlets may not be available on new jobsites or while working on sites with old electrical systems. Bosch suggests that this can affect the functioning of the AIM system and reduce its effectiveness in mitigating the risk of injury.

Response 7: Staff conducted tests with AIM-equipped table saws, and the results showed that the AIM system was effective without being connected to a properly grounded outlet.

Comment 8: PTI commented that UL and CPSC staff have recognized that there will be accidents where AIM technology cannot prevent severe injury. PTI questions how much the assumed effectiveness of AIM technology should be reduced in light of such accidents, and whether the Commission has taken this into account in its economic benefit-cost analysis.

Response 8: A performance requirement limiting the depth of cut to a test probe that contacts a saw blade to 3.5 mm will significantly reduce the number of severe injuries associated with operator blade-contact incidents on table saws. Lacerations less than 3.5 mm from the surface of the skin will not damage nerves or arteries, which would require surgery, and will not

result in fractures, amputations, or avulsions. Consistent with the hazard patterns identified in the 2017 Special Study and data provided by SawStop demonstrating that over 7,000 activations of the SawStop AIM technology resulted in no severe injuries, CPSC assesses that nearly all severe injuries involving operator-blade contact from table saws can be mitigated by the proposed performance requirements. Accordingly, this supplemental NPR's preliminary regulatory analysis conservatively assumes AIM technology is 90 percent effective in reducing the societal costs of blade-contact injuries.

Comment 9: Several commenters, including Robert Witte, Rob Degagne, and Kenny Smith, stated that most table saw injuries are caused by kickback of the workpiece, but the SawStop system does not prevent kickback. Others stated that riving knives eliminate kickback and therefore can prevent or mitigate most injuries.

Response 9: The Commission's analysis of blade-contact incidents indicates that there are many scenarios in which an operator's finger or hand can contact a table saw blade, and there are certain cuts on table saws that require removal of the blade guard. Sudden movement of the workpiece from kickback can cause the operator to lose control of the workpiece and cause the hand to fall into or be pulled into the blade. However, contact is also possible without kickback, for instance when the operator's hand gets too close to the blade while feeding a small workpiece, when the operator is distracted, when the blade catches the operator's glove and pulls the operator's hand into the blade, when the operator reaches to regain control of a workpiece, or when the operator brushes debris from the table while the blade is still spinning after shutoff. Based on incident information from the 2017 Special Study, PTI, and SawStop's activation data, CPSC staff assesses that most blade-contact injuries are not related to kickback, and in almost all instances AIM systems prevented serious injury, whether or not kickback was a factor.

In addition, although riving knives can reduce the potential for kickback, they do not eliminate table saw injuries. Information from the 2017 Special Study indicated that when blade

guards were in use, 28 percent of the incidents occurred on table saws equipped with a riving knife. PTI's comments to the 2017 NPR indicate that only 17 percent of accidents reported to PTI members from 2007 to 2015 involved kickback. Finally, of the accidents reported to PTI, 49 percent of the table saws involved were equipped with riving knives.

C. Benefits and Costs

Comment 10: Many commenters stated that the costs associated with the proposed rule are not justified because the cost to consumers outweighs the benefit of increased table saw safety.

Response 10: As discussed in detail in section X of this preamble, the estimated benefits from the proposed rule far exceed the estimated costs. Using a 3 percent discount rate, aggregate net benefits range from approximately $1.28 billion to $2.32 billion.

Comment 11: Many commenters, including hobbyist woodworkers and owners of small woodworking businesses, asserted that a standard mandating the inclusion of AIM technology in table saws will increase the price of table saws and make them unaffordable for many individuals, small businesses, and other groups of concern.

Response 11: As discussed in section X of this preamble, CPSC staff estimates that the prices for the least expensive bench saws now currently available will more than double to $400 or more. In general, the retail prices of bench saws could increase by as much as $285 to $700 per unit, and the retail prices of contractor and cabinet saws could rise by as much as $450 to $1,000 per unit. In addition, potential adverse impacts on the utility of table saws could come in the form of consumers who choose not to purchase table saws due to price increases, and a loss of portability due to the increased weight and (potentially) size of table saws to accommodate AIM technology. The Commission seeks comment on all aspects of the SNPR's proposal, including the effects of the expected price increases on consumers generally, or specific groups of consumers.

Comment 12: Some commenters, including hobbyist woodworkers, small business owners, and the Chief Counsel for Advocacy of the Small Business Administration, expressed concern with the potential effects of the proposed rule on small businesses, and in particular whether the proposed rule could dissuade the creation of small businesses.

Response 12: While the proposed rule has no direct effect on regulations or laws concerning small business creation, the rulemaking would affect small businesses that produce table saws by prohibiting the sale of table saws without an AIM system. This prohibition could cause some businesses to exit the table saw market and could indirectly act as a barrier to market entry. Should the holders of patents for AIM technologies refuse to license the technologies, firms would either have to develop their own technology or leave the table saw market. This could raise the general cost to start a small business, possibly to a significant extent. However, there appear to be multiple, competing AIM technologies already available, and adoption of the proposed rule could speed the development of additional AIM technology options, leading to greater licensing opportunities for table saw manufacturers.

Comment 13: Some commenters, including Nicholas Vanaria and Jarrett Maxwell, expressed concern that the proposed rule might incentivize U.S. table saw manufacturers to move their operations to other countries, resulting in domestic job loss.

Response 13: CPSC is not aware of any specific information or data supporting the speculative possibility that manufacturers might relocate to other countries in response to the proposed rule. In addition, the proposed rule would apply to all table saws imported into the United States, regardless of their place of manufacture, and relocating manufacturing operations to a different country would thus not exempt them from the rule. The Commission therefore finds it unlikely that the proposed rule would incentivize foreign relocation of U.S. businesses to any significant extent.

Comment 14: Several commenters, including Keith Nuttle, Scott Moore, Mark Strauch, and Christopher Fray, stated that the risk of injury as discussed in the 2017 NPR and the Special

Study should have been expressed in terms of the number of cuts made or exposure to table saws, rather than the number of table saws. Commenters stated that millions of cuts are made every year without incident.

Response 14: CPSC analyzed the risk of injury using the estimated number of table saws in use for each year because that is relevant data to which the Commission staff has access. Commenters did not provide sufficient data on risks per cut or exposure for staff to perform an analysis using those metrics.

D. Consumer Choice and User Behavior

Comment 15: Numerous commenters, including hobbyists and professional woodworkers, stated that table saw users should apply common sense when operating a table saw and accept the risk of using the tool. The commenters stated that the federal government should not regulate consumer choice or behavior. While most of these commenters stated that they want table saws equipped with AIM technology to be available, and some even stated that they own a SawStop saw, they supported preserving consumers' ability to evaluate costs and benefits for themselves and choose between more expensive AIM-equipped table saws and less expensive table saws without AIM technology. The Chief Counsel for Advocacy of the Small Business Administration suggested an alternative approach whereby manufacturers could continue to produce and sell table saws without AIM technology as long as they also sell a model equipped with AIM technology.

Response 15: There are some situations in the workshop that require table saw operators to remove blade guards, and an operator's decision to use a table saw without all safety devices in operation does not necessarily reflect neglect or ignorance. There are also many situations in which an operator's finger or hand may contact a blade that do not result from operator irresponsibility or negligence. Sudden movement of the workpiece from kickback can cause the operator to lose control of the workpiece and a hand to fall into or be pulled into the blade. An operator may become distracted by events outside their control and inadvertently contact the

blade. Many scenarios leading to blade contact become more likely if the consumer is tired or if the consumer's view of the blade or cut is impaired in some way. In these cases, which the proposed rule would likely address, operator neglect or ignorance would not be the primary factor causing the injury.

As discussed in more detail in section X of this preamble, the proposed rule is expected to reduce amputations and other serious blade-contact injuries with a net societal benefit exceeding $1 billion per year because it would not permit table saws on the market which are not equipped with AIM technology. While staff anticipates that some table saw models would be completely removed from the market as a result of the rule, the proposed rule would also substantially reduce the number of serious blade-contact injuries involving table saws, and their associated societal costs. In addressing the blade-contact risk, the CPSC considers the costs of blade-contact injuries, the utility of tables saws, and the impacts of limiting consumer choice. Further, the Commission has considered alternatives to the draft proposed rule that would not require all table saws to be produced with AIM technology. These alternatives are discussed in section X of this preamble.

Comment 16: Several commenters, including Robert Witte, Steven Schneider, and Bret Jacobsen, stated that adding AIM technology to table saws will give users a false sense of security and therefore increase unsafe user behavior with table saws that will also translate to injuries on other power tools. These commenters expressed concern that users will not learn to respect the dangers of table saws and power tools in general.

Response 16: While consumers who are aware that their table saws use AIM technology may react by taking less care to protect themselves from serious finger and hand injuries, people also tend to fear "dread risks," which can be defined as "low-probability, high-consequence events," and such risks have a substantial influence on risk perception. Severe injuries from blade contact on a table saw that employs an AIM system would fall under the category of a "dread risk" because the consequences of such a system failing could be quite severe – involving

possible amputation, which would likely evoke visceral feelings of dread or horror – even if the probability of such a failure is low. In addition, consumers likely would be motivated to avoid blade contact even if the consequences of such contact are not severe, because consumers are unlikely to be ambivalent about being cut by a spinning blade with sharp teeth, even if the resulting injury is minor.

The Commission is not able to predict whether consumers will take less care when using a table saw with an AIM system, relative to current table saws—much less whether users' behavior with other power tools might change for the worse. However, even if this does come to pass, if the AIM system is effective then the severity of an injury resulting from blade contact will be lessened, which would reduce the overall number of severe injuries associated with table saws.

Comment 17: Many commenters, including Douglas Allen and Robert Witte, suggested that, if AIM is required for all table saws, then some users might modify their saws to bypass the safety mechanism. In particular, commenters suggested that some users would engage in this behavior to avoid the nuisance of false activations.

Response 17: Because AIM technology is not expected to interfere with normal use of the table saw, most consumers would have little or no reason to bypass the AIM system once it is already on the saw.

Comment 18: Numerous commenters stated that, in order to avoid paying for a table saw with additional safety features, consumers will likely employ more dangerous methods to cut wood by using other tools such as circular saws, buying used table saws, or continuing to use older table saws that are less safe.

Response 18: The proposed rule will increase the price of table saws, and this increase is likely to reduce sales. Some consumers may hire professionals instead of doing projects themselves. Others might borrow or rent table saws, or use older table saws that they would have preferred to replace. Some might attempt to use other tools in the place of AIM-equipped

table saws, as the commenters suggest. If the other tools and strategies used by consumers are more dangerous than table saws equipped with AIM technology, the effectiveness and societal benefits of the proposed rule would be reduced. However, as discussed in section X of this preamble, even if the proposed rule is assumed to be only 70 percent effective at mitigating or preventing serious injuries, the proposed rule's benefits still substantially exceed its costs.

E. Availability of AIM Technology

Comment 19: Several commenters, including businesses, trade associations, and individual table saw consumers, as well as the Chief Counsel for Advocacy of the Small Business Administration, stated in response to the 2017 NPR that the proposed rule would effectively create a monopoly, because it would require table saw manufacturers to either license the only known effective AIM system or exit the table saw market. PTI relatedly commented that various theoretical detection systems for AIM have not yet been invented in a practical form that can be integrated into table saws.

Response 19: The Commission is aware of three firms that supply, or have supplied, the U.S. market with table saws equipped with AIM technology. These are SawStop (now owned by TTS), which equips all of its table saw models with AIM technology; Bosch, which formerly sold one model that was equipped with AIM technology, but does not currently sell an AIM-equipped table saw in the United States; and the Felder Group, which offers a single AIM-equipped model.

However, the proposed rule does not specify a particular detection system that must be used to meet the performance requirement; it instead allows manufacturers to use any detection system that meets that requirement. The implementation of a performance requirement instead of a technology requirement will encourage innovation in the development of new technologies. Indeed, in the time since the 2017 NPR was published, the Felder Group has developed its new technology called the preventative contact system (PCS), which detects motion by creating a capacitive field around the blade and reacts to impending blade contact by retracting the blade

below the table surface in milliseconds. Retraction of the blade is achieved by reversing the polarity of two strong electro-magnets that hold the blade arbor in place.

While we are mindful that the current suppliers of AIM technologies might be able to exert significant power in the U.S. table saw market for a period of time if the proposed rule is adopted, the unusually extended effective date proposed in this SNPR (36 months from publication of a final rule in the *Federal Register*), together with the encouragement of innovation in AIM that the rule should produce, sufficiently address this concern. We seek comment on this analysis.

F. Voluntary Standards and Other Alternatives to the Proposed Rule

Comment 20: Several commenters stated that table saw injuries are best reduced by training and educating users on safe practices and operation of table saws. Many commenters believed that mandatory training in the form of certification is needed.

Response 20: Warnings are less effective at eliminating or reducing exposure to hazards than designing the hazard out of a product or guarding the consumer from the hazard.[17] Warnings do not prevent consumer exposure to the hazard; they instead rely on educating consumers about the hazard and then persuading consumers to alter their behavior in some way to avoid the hazard. In addition, warnings rely on consumers behaving consistently, regardless of situational or contextual factors such as fatigue, stress, or social influences. Thus, warnings are most suitable to supplement, rather than replace, redesign or guarding, unless those higher-level hazard control efforts are not feasible.

Mandatory training for consumers who purchase or use table saws is not a solution the Commission would be able to implement under its current statutory authority.

Comment 21: PTI stated that the 2017 Special Study should be understood as confirming that the voluntary standards process for table saws is working. PTI suggests that the Study

[17] Smith, Timothy P., 2016. Human factors assessment of blade-contact scenarios and responses to ANPR public comments (Tab E of NPR Staff Briefing Package). Bethesda, MD: U.S. Consumer Product Safety Commission (November 15, 2016).

underestimated the benefits of the modular blade guard system required by the voluntary standard, and PTI believes that the risk of injury on a table saw equipped with a modular blade guard system is lower than reported in the Study. PTI states that its own estimates of table saw sales and populations, modular blade guard market penetration, and table saw lifespan differ from the estimates used in the Study.

Response 21: Since the 2017 Special Study was published, CPSC staff has conducted trend analyses of NEISS injuries associated with table saws. In every trend analysis, the latest of which spans from 2010 to 2021, there is no indication that table saw injuries have declined, even though table saws equipped with modular blade guard systems have come to represent the majority of the table saw population. This indicates that the voluntary standard's requirement that table saws be equipped with modular blade guards is not effective in reducing the number or severity of table saw injuries.

Comment 22: In their comments in response to the 2017 Special Study, Stephen Gass and David Pittle questioned whether the Study's conclusion that the risk of a blade-contact injury is seven times greater on a table saw equipped with a traditional blade guard system than with a modular blade guard system is inconsistent with CPSC staff's conclusion that there has been no statistically significant reduction in blade-contact injuries over the time period when table saws equipped with modular blade guards have saturated the market.

Response 22: If modular blade guard systems reduce the number or severity of blade-contact injuries in comparison to traditional blade guard systems, a detectable decreasing trend should exist within the NEISS data over the period during which table saws equipped with modular blade guards replaced in the market those equipped with traditional blade guards. In the 2017 NPR, the Commission preliminarily concluded that no such trend was detectable. This SNPR includes further trend analysis with data extending through 2021, and again identifies no statistically significant decreasing trend in the number or severity of blade-contact injuries. As discussed in section X of this preamble, the 2017 Special Study represents only a snapshot view

of a single year, as opposed to the multiple trend analyses that were more comprehensive and longer-term, and there are other significant caveats to the Special Study's finding on this point. CPSC staff has determined that the voluntary standard has not effectively reduced the number or severity of blade-contact injuries, notwithstanding the results of the Special Study.

Furthermore, even taking at face value the Special Study's conclusion that blade-contact injuries are roughly seven times more likely on table saws equipped with traditional blade guard systems, tens of thousands of blade-contact injuries continue to occur each year, more than a decade after modular blade guard requirements were incorporated into the voluntary standards. Thus, there remains an unreasonable risk of serious injury associated with table saw use, regardless of which type of blade guard system is used.

We seek further comments on this issue.

Comment 23: Several commenters stated that CPSC should mandate AIM technology on table saws only in industrial or workshop settings or schools, provide an open license for AIM technology, and/or ensure that the price of table saws with AIM technology decreases as costs for manufactures decrease with economies of scale.

Response 23: The CPSA does not give the Commission authority to regulate the use of table saws in industrial settings, to license patents, or to control the cost of products.

IX. Description of the Proposed Rule

A. Scope, Purpose, and Effective Date - § 1264.1

The proposed rule would apply to all table saws that are consumer products, as defined in the proposed rule, including bench saws, contractor saws, and cabinet saws. The proposed rule would include a requirement to mitigate the risk of blade-contact injuries on table saws.

Under section 9(g)(1) of the CPSA, 15 U.S.C. 2058(g)(1), the effective date for a consumer product safety standard must not exceed 180 days from the date the final rule is published, unless the Commission finds, for good cause, that a later effective date is in the public interest. As discussed in section XVI of this preamble, the Commission finds that 180 days is

not adequate to allow for manufacturers to comply with the final rule, or for the rule to have its desired effect of promoting the development and commercial availability of additional AIM technologies. The Commission therefore proposes an effective date of 36 months following *Federal Register* publication of a final rule. The proposed rule clarifies that the rule would apply to all table saws manufactured after the effective date.

B. Definitions - § 1264.2

The proposed rule would provide that the definitions in section 3 of the CPSA (15 U.S.C. 2051) apply. In addition, the proposed rule would define "table saw" as: "a woodworking tool that has a motor-driven circular saw blade, which protrudes through the surface of a table." In order to more precisely define the scope of the rule and account for additional classifications used by some industry participants, the definition has been revised from the definition set out in § 1245.2 of the rule proposed in the NPR to specify that "[t]able saws include bench saws, jobsite saws, contractor saws, hybrid saws, cabinet saws, and sliding saws," and that "[t]able saws may be powered by alternating current from a wall outlet or direct current from a battery." The Commission seeks comment on this proposed definition of a table saw.

C. Requirements for Table Saw Blade Contact - §§ 1264.3 and 1264.4

The proposed rule would require table saws, when powered on, to limit the depth of cut to 3.5 mm when the center axis of the test probe, acting as a surrogate for a human finger or other body part, is moving parallel to, and is 15 ± 2 mm above the table top at a rate of 1 m/s and contacts the spinning blade that is set at its maximum height setting. The rule would require that the test probe allow for the accurate measurement of the depth of cut to assess compliance with the proposed requirement.

The composition and form of the test probe are not defined. However, any test probe that is used should have the appropriate properties (such as electrical, optical, thermal, electromagnetic, ultrasound, etc.) to indicate human body/finger contact with the saw blade, and the appropriate physical properties to accurately measure depth of cut. While the test probe and

test method described in TAB A of staff's 2017 briefing package are considered appropriate for the evaluation of AIM systems using an electrical detection system, the Commission does not propose to make this test method mandatory, because other AIM systems may use a different detection approach. For AIM systems using a different detection approach, the method should be developed based on sound material science and engineering knowledge to accurately assess compliance with the proposed requirement.

A performance requirement that limits the depth of cut to 3.5 mm at an approach rate of 1 m/s will significantly reduce the severe lacerations, fractures, amputations, and avulsions associated with operator blade-contact incidents on table saws, because the probe will have the appropriate properties to indicate human contact with the saw blade and the equivalent injury mitigation on a real human finger will avoid most microsurgery.

The Commission recognizes there may be some scenarios, such as kickback, which can cause the operator's hand to be pulled into the blade at a high rate of speed or lead the operator to reach as fast as possible for a falling workpiece. In these and other scenarios, the speed of the operator's hand or finger may exceed 1 m/s when it contacts the saw blade. At approach speeds greater than 1 m/s, AIM system performance may not be sufficient to prevent injuries that require extensive medical attention. The use of AIM technology may, however, limit injuries where an incident otherwise would have resulted in an amputation or involved injury to several digits or a wider area, to permit instead microsurgical repair of nerves, blood vessels, and tendons. Thus, the Commission concludes that nearly all operator blade-contact injuries from table saws would be eliminated or mitigated by the proposed performance requirement.

D. Prohibited Stockpiling - § 1264.5

In accordance with section 9 of the CPSA, the proposed rule contains a provision that would prohibit a manufacturer from "stockpiling," or substantially increasing the manufacture or importation of noncompliant table saws between the promulgation of the final rule and its effective date. The provision would prohibit a firm from manufacturing or importing

noncompliant table saws at a rate that is greater than 115 percent of the rate at which the firm manufactured and/or imported table saws during the base period. The base period is the 12-month period immediately preceding the promulgation of the final rule. The cap on manufacture or importation has been reduced from the 120 percent cap proposed in the 2017 NPR to reflect the growth rate of the table saw market over recent years.

The Commission seeks comments on the proposed product manufacture or import limits and the base period with respect to the anti-stockpiling provision.

E. Findings in the Appendix to the Rule

The findings required by section 9 of the CPSA are discussed throughout the preamble of this proposed rule and specifically set forth in the appendix to the rule.

X. Updated Preliminary Regulatory Analysis

The Commission is proposing to issue a rule under sections 7 and 9 of the CPSA. The CPSA requires that the Commission prepare a preliminary regulatory analysis and that the preliminary regulatory analysis be published with the text of the proposed rule. 15 U.S.C. 2058(c).

The Commission's updated preliminary regulatory analysis is contained in TAB A of staff's briefing package, [18] and is summarized in this section.

A. Introduction

The CPSC is issuing a proposed rule to address the unreasonable risk of blade-contact injuries associated with table saws. This rulemaking proceeding was initiated by an ANPR published in the *Federal Register* on October 11, 2016. In 2015, to enhance CPSC's understanding of the table saw market, CPSC staff entered into two contracts with Industrial Economics, Inc. (IEc) to conduct market research and cost impact analysis on table saws. One report, titled "*Revised Final Table Saws Market Research Report*" (March 28, 2016) (referred to

[18] Available at https://www.cpsc.gov/s3fs-public/Federal-Register-Notice-Safety-Standard-Addressing-Blade-Contact-Injuries-on-Table-Saws-SNPR.pdf?VersionId=Ce3FOVBmbG0_.8j.gd1h0k3VWHZZ.URw.

as IEc, 2016a), updates information relied upon in the ANPR. The report uses publicly available information and limited outreach to potentially affected entities. The other report, titled "*Final Table Saws Cost Impact Analysis*" (June 9, 2016) (referred to as IEc, 2016b), estimates the manufacturing and other costs of possible requirements intended to mitigate table saw blade-contact injuries based on previous information collected by the CPSC in the ANPR, public comments, limited interviews with table saw manufacturers, additional research, and the results of IEc, 2016a. In addition to CPSC staff's analysis of existing data, studies, and reports, staff relied on the IEc reports for additional data and information to support the preliminary regulatory analysis (TAB C of the staff NPR briefing package) and initial regulatory flexibility analysis (TAB D of the staff NPR briefing package). These reports are available on the CPSC website at https://www.cpsc.gov/research-statistics/other-technical-reports.

B. Market Information

1. Manufacturers

The Commission has identified 23 firms that supply table saws to the U. S. market.[19] PTI estimates that its member companies account for 80 percent of all table saws sold in the United States.[20] Most of these companies are large, diversified international corporations with billions of dollars in sales, such as Stanley Black and Decker, Robert Bosch, Makita, TTS, and Techtronic Industries Co., Ltd. These five large, diversified firms are currently supplying table saws to the U.S. market, but table saws make up a relatively small part of their revenues, probably less than one percent in each instance.

For smaller, more specialized firms, table saws are generally not a large percentage of firms' sales. One company reported that table saw sales contribute a negligible fraction of its $15 million annual revenue. IEc, 2016a. Another company with an annual revenue of $20 to

[19] *See* TAB A of Staff Briefing Package.
[20] PTI, 2012. Comment by Susan M. Young for the Power Tool Institute, Inc., on "U.S. Consumer Product Commission [Docket No. CPSC-2011-0074] Table saw blade contact injuries: Advance notice of proposed rulemaking," (March 16, 2012). (Comment CPSC-2011-0074-1081, available at: regulations.gov).

$40 million stated that table saws represent approximately five percent of total sales. *Id.* A third business CPSC staff interviewed attributed seven to eight percent of total revenue to table saw sales. *Id.*

2. Types of Table Saws Commonly Used By Consumers

As discussed in section III of this preamble, table saws are generally grouped into three categories: bench saws, contractor saws, and cabinet saws. Bench saws (which include saws sometimes referred to as jobsite saws) tend to be lightweight and portable, and are the least expensive of the three categories. Contractor saws are larger, heavier, more powerful, and more expensive than bench saws. Cabinet saws are the heaviest, most powerful, and most expensive of the categories. Some manufacturers also categorize table saws as "hybrid saws" or "sliding saws." Sliding saws are similar to cabinet saws, but typically are equipped with an extension that allows for the cutting of large panels, have advanced electronic features, and sometimes include a Graphical User Interface (GUI) for operation. Nearly all sliding saws weigh more than 900 pounds and require equipment to move or relocate.

3. Retail Prices of Table Saws

The range of prices for table saws generally overlaps for three products: bench, contractor, and hybrid saws. Bench saws are the least expensive, ranging in price from $139 to $1,399. Prices for contractor saws range from $599 to $1,999, and prices for hybrid saws range from $895 to $4,279. Generally, cabinet and sliding saws are more expensive. Prices for cabinet saws range from $1,399 to $4,999. The price range for sliding table saws is wide, with models priced below $3,400 and above $25,000. SawStop models containing AIM technology are consistently priced at the upper end of the price range for each of the three primary table saw categories (bench, contractor, and cabinet). The least expensive saw available from SawStop is the compact table saw priced at $900. The SawStop bench saw is the most expensive in the bench saw category at $1,599 to $1,799, depending on the distributor. Similarly, SawStop contractor saws, ranging in price from $1,999 to $2,398, represent some of the more expensive

models in that product category. The SawStop cabinet models range in price from $2,899 to $5,949, depending on power and performance. The Felder Group model equipped with AIM technology is priced at the high end of the sliding saw price range, with prices exceeding $25,000 depending on model options/upgrades.

4. Sales and Numbers in Use

Although the design and engineering of table saws may occur in the United States, most table saws currently are manufactured overseas. Data from the U.S. International Trade Commission indicates that from 2014 to 2017 approximately 99 percent of imported table saw units were built in Taiwan and China. A small volume of expensive industrial saws was also imported from European and Canadian manufacturers.[21]

CPSC staff estimated the annual number of table saws in use with the CPSC's Product Population Model (PPM), a statistical model that projects the number of products in use given examples of annual product sales and product failure rates. Total annual shipments of all table saws to the U.S. market from 2002 to 2017 are estimated to have ranged from 429,000 to 825,000, and total annual shipments from 2018 to 2020 are estimated to have ranged from 746,000 to 995,000. Estimates of industry-wide sales value are not readily available. CPSC staff estimated that bench saws account for about 79 percent of the units sold, with contractor saws (including hybrids) and cabinet saws accounting for approximately 12 percent and 9 percent, respectively.

Staff calculated an average product life of 10 years for bench saws, 17 years for contractor saws, and 24 years for cabinet saws. Using these parameters, staff projected a total of about 8.2 million table saws in use in the United States in 2017, including about 5.35 million bench saws (about 65 percent), 1.4 million contractor saws (about 17 percent), and 1.46 million cabinet saws (about 18 percent).

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[21] Data compiled from tariff and trade data from the U.S. Department of Commerce and the ITC for Harmonized Tariff Schedule classification numbers 8465910036 (Tilting arbor table saw, woodworking) and 8465910078 (Sawing machines, woodworking, NESOI). *See* https://hts.usitc.gov.

C. Benefit-Cost Analysis

This section of the analysis consists of a comparison of the benefits and costs of the proposed rule and explains the Commission's preliminary conclusion that the expected benefits of the proposed rule exceeds its expected costs by a wide margin.[22] The benefits of the proposed rule are measured as the estimated reduction in the societal costs of injuries resulting from the use of saws containing the AIM technology. The costs of the proposed rule are defined as the added costs associated with the incorporation of the AIM technology in table saws, including the cost of the labor (at both the design and manufacturing stages) and materials required to manufacture table saws that comply with the rule. The rule would also have a cost to consumers in the form of consumer surplus loss resulting from higher prices on table saws. Staff calculated the benefits and costs of the proposed rule on a per-product-in-use basis. Benefits and costs are presented in 2021 dollars.

1. Baseline Risk and Conflicting Data

Beginning in 2010, the voluntary standards governing table saws (at that time UL 987; currently UL 62841-3-1) have required table saws to be equipped with modular blade guard systems, riving knives, and anti-kickback devices. To quantify the hazards associated with blade-contact injuries and to evaluate the effectiveness of the voluntary standards, CPSC staff conducted the 2017 Special Study. Of the 26,501 blade-contact injury cases analyzed for the Special Study, staff concluded that 12.2 percent involved saws that were compliant with the voluntary standard, 19.6 percent involved table saws with "unknown" blade guard types, and the remainder of incidents involved non-compliant saws. The Special Study found that the relative risk of a blade-contact injury was 7.19 times greater for a non-compliant saw than a complaint saw.

[22] *See* TAB A of Staff's Briefing Package for a detailed analysis of the expected benefits and costs of the proposed rule.

However, there are significant caveats to this finding. First, the Special Study is a snapshot analysis based on only one year of incidents. Second, there is a significant proportion of injuries associated with "unknown" blade guard types. Third, the study does not account for characteristics of the study group. For example, the study did not reveal if the consumers who purchased compliant saws were more risk-averse or safety-conscious. If this was the case, members of that group would be less likely to be involved in a table saw-related injury regardless of the type of blade guard in use. Notably, as discussed in more detail in section IV of this preamble, the NEISS data trend indicates that the rate of table saw blade contact injuries has not declined in more than a decade after the introduction of the modular blade guard requirement. Given this data, CPSC assesses that the voluntary standards have not been effective in the long run at reducing blade contact injuries.

2. Blade-Contact Injuries

The proposed rule is intended to address table saw injuries resulting from blade contact by requiring table saws to be equipped with AIM technology. According to the 2017 Special Study, there were an estimated 26,501 blade contact injuries initially treated in U.S. hospital emergency departments in 2017. The number of table saw injuries initially treated outside of hospital EDs is estimated with the CPSC's Injury Cost Model (ICM), which uses empirical relationships between the characteristics of injuries (diagnosis and body part) and victims (age and sex) initially treated in hospital EDs and the characteristics of those initially treated in other settings.[23] Based on the 2017 annual estimate of 26,501 blade contact injuries initially treated in hospital EDs, as determined in the 2017 Special Study, the ICM projects an additional 22,675 blade contact injuries treated in other treatment settings.

[23] Lawrence, BA, Miller, TR, Waejrer, GM, Spicer, RS, Cohen, MA, Zamula, WW, 2018. The Consumer Product Safety Commission's Revised Injury Cost Model. Maryland: Pacific Institute for Research and Evaluation. (Ferbruary 2018). Available at https://www.cpsc.gov/s3fs-public/ICM-2018-Documentation.pdf?YWuW4Jn0eb2hExeA0z68B64cv6LIUYoE.

Thus, there was an estimated annual total of about 49,176 medically treated blade-contact injuries. About 60.9 percent of those injuries involved bench saws; 27.1 percent involved contractor saws; and 9.1 percent involved cabinet saws. About 3 percent involved table saws of unknown type. Staff estimates that approximately 21,504 injuries (about 43.7 percent) were treated in doctors' offices or clinics, and 1,171 injuries (about 2.4 percent) resulted in direct hospital admission, bypassing the ED. Overall, about 9.8 percent of the medically treated injuries resulted in hospitalization, either directly or following treatment in an ED.

An estimated 90.1 percent of the injuries involved fingers, with almost all of the remainder involving the hand. About 9.1 percent of the medically treated injuries involved amputations; 58.1 percent involved lacerations; and 23.5 percent involved fractures. About 33.4 percent of the amputations resulted in hospital admission, compared to about 5.9 percent of lacerations and 14.2 percent of fractures. Only about 28.7 percent of the amputations were projected to be treated in doctors' offices, clinics, and other non-hospital settings, compared with about 42.0 percent of lacerations and 49.4 percent of fractures.

The blade-contact injury rate per 100,000 saws is calculated by dividing the number of medically-treated injuries by the estimated number of table saws in use. Using the data from the 2017 Special Study, there were approximately 559 bench saw-related injuries per 100,000 bench saws in use; 951 contractor saw-related injuries per 100,000 contractor saws in use; and 306 cabinet saw-related injuries per 100,000 cabinet saws in use.

3. Injury Costs of Blade Contact Injuries

The societal costs of blade-contact injuries are quantified using the ICM. The ICM's components for injury costs include medical costs, work losses, and the intangible costs associated with lost quality of life or pain and suffering.

Medical costs include three categories of expenditures: (1) medical and hospital costs associated with treating the injured victim during the initial recovery period and in the long run, including the costs associated with corrective surgery, the treatment of chronic injuries, and

rehabilitation services; (2) ancillary costs, such as costs for prescriptions, medical equipment, and ambulance transport; and (3) costs of health insurance claims processing. Cost estimates for these expenditure categories were derived from a number of national and state databases, including the Medical Expenditure Panel Survey, the National Inpatient Sample of the Healthcare Cost and Utilization Project (HCUP-NIS), the Nationwide Emergency Department Sample (NEDS), the National Nursing Home Survey (NNHS), MarketScan® claims data, and a variety of other Federal, State, and private databases.

Work loss estimates include: (1) the forgone earnings of the victim, including lost wage work and household work; (2) the forgone earnings of parents and visitors, including lost wage work and household work; (3) imputed long term work losses of the victim that would be associated with permanent impairment; and (4) employer productivity losses, such as the costs incurred when employers spend time rearranging schedules or training replacement workers. Estimates are based on information from HCUP-NIS, NEDS, Detailed Claims Information (a workers' compensation database), the National Health Interview Survey, the U.S. Bureau of Labor Statistics, and other sources.

The intangible, or non-economic, costs of injury reflect the physical and emotional trauma of injury as well as the mental anguish of victims and caregivers. Intangible costs are difficult to quantify because they do not represent products or resources traded in the marketplace. Nevertheless, they typically represent the largest component of injury cost and must be accounted for in any benefit-cost analysis involving health outcomes.[24] The ICM develops a monetary estimate of these intangible costs from jury awards for pain and suffering.

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[24] Rice, Dorothy P., MacKenzie, Ellen J., and Associates, 1989. *Cost of injury in the United States: A report to Congress*. San Francisco, CA: Institute for Heath & Aging, University of California and Injury Prevention Center, The Johns Hopkins University; Haddix, Anne C., Teutch, Steven M., Corso, Phaedra S., 2003. *Prevention effectiveness: A guide to decision and economic evaluation* (2nd ed.). New York: Oxford University Press; Cohen, Mark A., Miller, Ted R., 2003. "Willingness to award" nonmonetary damages and implied value of life from jury awards. *International Journal of Law and Economics*, 23 at 165-184; Neumann, Peter J., Sanders, Gillian D., Russell, Louise B., Siegel, Joanna E., Ganiats, Theodore G., 2016. *Cost-effectiveness in health and medicine: Second Edition*. New York: Oxford University Press.

Estimates for the ICM were derived from regression analysis of jury awards in nonfatal product liability cases involving consumer products compiled by Jury Verdicts Research, Inc.

This regulatory analysis discounts future benefits and costs using a 3 percent discount rate. The 3 percent rate is intended to represent what is sometimes called the "social rate of time preference," which is consistent with the rate at which society discounts future consumption flows to their present value.[25]

Based on ICM estimates and utilizing the 3 percent discount rate, the present value of total injury costs associated with the estimated 49,176 medically treated table saw injuries amounted to $3.97 billion. This suggests injury costs of about $80,650 per injury (*i.e.*, $3.97 billion ÷ 49,176 injuries). This high estimate is largely driven by the costs associated with amputations. While amputations accounted for approximately 9.1 percent of injuries, they accounted for almost 55.3 percent of total estimated costs.

The distribution of injury costs by medical treatment setting is provided in table 5. Overall, medical costs and work losses accounted for 31 percent of the total, while the non-economic losses associated with pain and suffering accounted for 69 percent.

Table 5. Annual Societal Costs Associated with Table Saw Blade Contact Injuries, by Medical Treatment Setting and Injury Cost Component (2021 dollars; 3% discount rate)

Medical Treatment Setting	Average Cost per Injury, by Cost Component			
	Medical	Work Loss	Pain and Suffering	Total
Doctor/Clinic	$705	$1,982	$21,970	$24,657
Emergency Department (ED)	$2,206	$1,894	$30,211	$34,311

[25] OMB, 2003. *Circular A-4: Regulatory analysis.* Washington, DC: Office of Management and Budget. https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A4/a-4.pdf; Gold, Marthe R., Siegel, Joanna E., Russell, Louise B., Einsteinin, Milton C., 1996. *Cost-effectiveness in health and medicine*. New York: Oxford University Press; Haddix, et al., *supra* note 24.

Hospital, Admitted via ED	$18,548	$197,213	$308,001	$523,761
Direct Hospital Admission	$18,999	$208,590	$333,386	$560,975

Estimates of the present value of these societal costs from blade-contact injuries, per table saw in use, and by saw type, are presented in table 6. Row (a) shows aggregate annual societal costs, by type of saw. Annual societal costs per saw are presented in row (c) and are calculated by dividing the aggregate annual societal costs, row (a), by table saws in use, row (b). The present value of annual societal costs at a 3 percent discount rate are presented in row (e) and range from $3,503 per bench saw to $12,865 per cabinet saw. These present value figures represent the maximum benefits that could be derived from a rule addressing blade-contact injuries if such a rule prevented 100 percent of all such injuries.

Table 6. Present Value of Societal Costs of Injuries per Table Saw in Use, by Table Saw Type (based on blade contact injuries in 2017)

	Table Saw Type		
	Bench	Contractor	Cabinet
(a) Aggregate Annual Societal Costs (Millions $)	$2,198. 29	$612. 49	$1,099. 81
(b) Table Saws in Use (Millions)	5. 35	1. 40	1. 45
(c) Annual Societal Costs per Table Saw [(a) ÷ (b)]	$411	$437	$760
(d) Expected Useful Product Life (years)	10	17	24
(e) Present Value of Societal Costs, Over Expected Product Life (3 percent discount rate)	$3,503	$5,750	$12,865

4. Effectiveness and Expected Benefits of the Proposed Rule

The effectiveness of AIM technology in preventing blade-contact injuries is expected to be high. However, not all injuries would be prevented, because the AIM system activates after the hand or finger comes into contact with an operating blade. Moreover, it will not mitigate all severe blade-contact injuries. For example, it will not mitigate potentially severe blade contact injuries that occur: (1) when the saw is not running; (2) when the blade is operating but the AIM system has been deactivated; (3) when the operator's hand is moving into the blade so quickly that contact with the blade cannot be reduced sufficiently to prevent serious injury; or (4) when the AIM technology leads to complacency or reductions in safety efforts on the part of users that result in injuries the AIM technology is unable to prevent, which may or may not involve blade contact. An example of the fourth category might be an operator's decision to remove other safety equipment on the table saw, such as an anti-kickback pawl, which might increase the likelihood of an injury involving wood thrown back at the operator.

While there is insufficient information to quantify the impact of these factors with precision, there is information to highlight their impact. The 2007–2008 table saw survey found that in 5.5 percent of table saw injuries, the motor was not running.[26] The 2014–2015 NEISS special study found that about 2.4 percent of the blade contact injuries involved saw blades that were not in operation at the time of injury or had just been turned off.[27] Additionally, the existing AIM technology cannot be used when cutting conductive materials, such as non-ferrous metals (*e.g.*, aluminum) or wood that is wet enough to conduct sufficient electricity to activate the AIM system. Consequently, table saws with existing AIM systems have a bypass mode that temporarily deactivates the AIM system to prevent nuisance tripping. Although the SawStop saws automatically reset to safety mode whenever restarted, some consumers might deactivate the AIM system even when it is not necessary to do so.

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[26] Chowdhury, Sadeq R., Paul, Caroleene, 2011. Survey of injuries involving stationary saws, table and bench saws, 2007-2008. Bethesda, MD: U.S. Consumer Product Safety Commission.

[27] Garland, Sarah, 2016. Table Saw blade contact injury analysis. Bethesda, MD: U.S. Consumer Product Safety Commission. (November 2016).

Given the factors discussed in this section, we assume that AIM technology is 90 percent effective in reducing the societal costs of blade contact injuries. Table 7 recalculates benefits with a 90 percent effective rate to estimate the benefits from the proposed rule.

Table 7. Expected Benefits, per Table Saw, Assuming 90% Effectiveness

Table Saw Type	PV of Societal Costs, Over Expected Product life (3 percent discount rate) (a)	Benefits at 90% Effectiveness, 3 Percent Discount Rate (b) = a × 90%
Bench	$3,503	$3,153
Contractor	$5,750	$5,175
Cabinet	$12,865	$11,579

As discussed previously in this section of the preamble, there is inconsistent evidence whether table saws complying with the modular blade guard system requirement in UL 62841-3-1 are substantially less likely to cause severe injuries. If the voluntary standard is in fact effective in reducing the number or severity of blade-contact injuries, the proposed rule's expected reduction in societal costs would be reduced, because some of the injuries that an AIM system would be expected to prevent would already have been prevented by adherence to the voluntary standard. For an analysis of expected benefits under an assumption that the voluntary standard is in fact effective, see staff's revised preliminary regulatory analysis.[28]

5. Costs to Meet Performance Requirements

Table saw manufacturers are likely to incur three primary types of costs to incorporate AIM technology into their table saws:

Costs of AIM technology. Manufacturers would have to either design and develop their own AIM technology or license an AIM technology developed and owned by another party. As previously noted, there are currently at most three suppliers of AIM technology. The Commission considers the development of additional AIM technologies likely if the proposed rule is adopted, but additional competitive entry is not certain. While most manufacturers of table saws would likely continue production by licensing an AIM technology, some firms,

[28] TAB A of Staff's Briefing Package.

especially smaller firms, would likely drop out of the market altogether, resulting in a loss of consumer surplus as well as increased prices due to lessened competition.

Redesign and retooling costs. Incorporating AIM technology into existing models would require manufacturers to redesign each model and retool the facilities where the saws are manufactured. For example, table saw models not currently incorporating AIM technology likely would require redesign to provide room for blade retraction, to allow access for users to change the cartridge and blade, and to withstand the force of the AIM system being triggered. PTI estimates that, on average, the cost to redesign and retool existing table saws would range from $2 million to $10 million per manufacturer.[29] Dr. Gass, however, has said that SawStop's tooling costs were approximately $200,000 for its first contractor/cabinet table saw, and approximately $700,000 for its first bench saw. He also emphasized some table saw models are minor variations on one another and share the same basic structure, which reduces costs of redesign and retooling.[30] Furthermore, foreign manufacturers may produce saws for multiple U.S. firms; the costs of retooling might be spread across several of their customers if the designs are similar enough.

Material and labor costs. The combination of adding a brake cartridge or other means of stopping or retracting the blade after contact with flesh, and redesigning the table saw to accommodate the additional electronic components and wiring, the required clearances, and the weight and dimensions of the AIM technology, would result in increased materials costs. For SawStop models in 2012, the additional cost associated with the AIM system was approximately $58.[31] An estimate from another firm, also in 2012, suggested $74 (including cartridge, electronics, and mechanical parts).

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[29] Grahan, J. 2010. Expert report of Dr. John D. Graham. (April 27). Submitted with PTI public comments (2012) CPSC-2011-0074-1106, available at: regulations.gov.
[30] IEc interview with Dr. Stephen Gass, Saw Stop, LLC, November 6, 2015.
[31] Gass, Stephen F., 2012. Comments and information responsive to ANPR for table saw blade contact injuries, by SawStop, LLC. (Mar. 16, 2012). Comment CPSC-2011-0074-1106, available at: regulations.gov.

The structure of some bench saws may need to be strengthened to improve stability and withstand the shock of blade braking and/or retraction. This strengthening may increase the overall weight of some of the lightest saws, reducing their portability and utility.

The commission seeks comments on the impact this proposed rule would have on existing firms.

D. Manufacturing Cost Impact

To estimate the per-unit manufacturing cost of requiring AIM technology for table saws, CPSC staff assume that the costs associated with the rule are fully pushed forward to consumers, and that the expected price increases are reflective of all costs of production and supply. However, these cost impacts do not include royalty fees, which are payments that manufacturers would have to make if they license the AIM technology from other firms rather than developing their own AIM systems. From a societal perspective, royalties represent a transfer payment from one party or sector to another. Because royalties essentially move money from one party to another, and are not payments for goods or services, they are not costs for purposes of the benefit-cost analysis.[32] Nevertheless, the royalties will have distributional impacts on manufacturers and consumers that are discussed below.

1. Manufacturing Costs

In 2015, SawStop predicted that retail prices for bench saws would increase by no more than $150 per unit as result of the rule.[33] Inflated to 2021 dollars, this results in an estimated increase of $193. In the absence of more specific information about manufacturing costs, CPSC staff used this figure as the basis for the low-end estimate of manufacturing cost increases for bench saws.

For contractor and cabinet saws, the low-end expected cost impacts were based on discussions with other industry members. One manufacturer estimated that the retail price of a

[32] OMB, 2003, *supra* note 25.
[33] SawStop, LLC. 2009. Presentation to CPSC, December 8 & 9; *Osorio v. One World Technologies, Inc.*, 659 F3d 81, 83 (1st Cir 2011).

single table saw model that they produce would increase by about 30 percent as a result of the rule, including the cost of royalties. Excluding royalties, and inflated to 2021 dollars, this estimate suggests a cost increase associated with redesign, retooling, and materials of about $321. For this analysis, we assume that this $321 low-end cost increase can be applied to all contractor and cabinet saws.

For bench saws, the high-end cost increase is based on information provided by PTI, whose members produce primarily bench saws. In 2012, PTI estimated that the increase would be $100 to $800 per saw, excluding royalties.[34] Inflated to 2021 dollars, the midpoint of this range is $651.

For contractor and cabinet saw models, we apply the high end of the range estimated by PTI and other manufacturers. One table saw manufacturer provided an estimate ranging from $500 to $800 for "larger saws," excluding royalties. Another manufacturer estimated that the retail price of saws would increase by 20 percent, excluding the cost of royalties. IEc, 2016b. Applying this percentage to the company's cabinet saw models results in added costs of about $260 to $800. CPSC assumes the high-end incremental cost increase is $1,002, which is the upper bound of each range suggested by PTI and these two manufacturers, inflated to 2021 dollars. These costs are for the first years following adoption of the proposed safety rule. In the longer term, after about 5 years, the incremental cost should decrease as AIM technology is better developed and deployed.

2. Replacement Parts Costs

In addition to the manufacturing costs just described, there will also be the added costs of replacement parts related to the AIM system. For purposes of this analysis, we base the cost of replacement parts on the SawStop system, which requires replacement of the brake cartridge and blade after activation of the system. Replacement part prices are estimated to include $95 for a

[34] PTI, 2012. Comment by Susan M. Young for the Power Tool Institute, Inc., on "U.S. Consumer Product Commission [Docket No. CPSC-2011-0074] Table saw blade contact injuries: Advance notice of proposed rulemaking," (March 16, 2012). (Comment CPSC-2011-0074-1081, available at: regulations.gov).

replacement brake cartridge, and $30 to $90 for a replacement blade.[35] Based on sales of replacement brake cartridges, SawStop estimates that the AIM system may activate about once every 9 years of use.[36] At a replacement rate of once every 9 years (and assuming $95 per replacement blade), this results in an annual per-unit replacement part cost of approximately $17. However, because blades deteriorate and require periodic replacement even in the absence of an AIM activation, CPSC assumes that the need for replacement blades due to AIM activation costs an average of about $14 annually. The present value of this expected annual cost of $14 over the life of a typical table saw, and discounted at a rate of 3 percent, would amount to about $118 for bench saws (with a 10-year expected product life), $183 for contractor saws (with an estimated 17-year product life), and $235 for cabinet saws (with an expected 24-year product life).

The SawStop data, however, may overstate the costs of replacement parts. For instance, the AIM-equipped Bosch REAXX bench saw, which has since been withdrawn from the U.S. market, utilized a $100 cartridge that was usable for two activations. Because the blade was not destroyed by the activation, the Bosch system had lower replacement part costs.

The direct manufacturing and replacement costs are presented in table 8 and rely on the low- and high-end direct manufacturing costs and the SawStop replacement costs just described.

Table 8. Direct Manufacturing and Replacement Costs

Table Saw Type	Direct Manufacturing Costs		Replacement Part Cost	Total Direct + Replacement Costs	
	Low-End Estimates	High-End Estimates		Low-End Estimates	High-End Estimates
Bench	$193	$651	$118	$311	$769
Contractor	$321	$1,002	$183	$504	$1,185
Cabinet	$321	$1,002	$235	$556	$1,237

E. Lost Consumer Surplus

[35] PTI, 2016. Table saw facts at a glance. Accessed June 20, 2016. Available at: http://powertoolinstitute.com/pti-pages/it-table-saw-facts.asp.

[36] SawStop, March 2011, Information Package for Petition CP-03-02. As cited in CPSC (2011). Table Saw Blade Contact Injuries; Advanced Notice of Proposed Rulemaking. September 14.

The increased retail prices of table saws, as compliance costs are passed on to consumers, would result in a reduction in table saw sales. Consumers who decide not to purchase table saws because of the higher prices would experience a loss in consumer surplus. The assumptions used by Commission staff to estimate the lost consumer surplus are explained in TAB A of staff's briefing package. Applying those assumptions, table 9 shows the expected reduction in annual sales and the expected lost consumer surplus as a result of adopting the proposed rule. Reduced sales could range from about 110,800 table saws under the low-end cost estimates (column a), to about 329,900 under the high-end cost estimates (column d), representing a sales reduction of about 17 percent to 50 percent, respectively. The annual loss in consumer surplus ranges from about $13.9 million under the low-end estimates (column c), to about $120 million under the high-end estimates (column f).

Table 9. Post-Regulatory Annual Table Saw Sales, Sales Reduction, and Lost Consumer Surplus

	Low-End Cost Estimate			High-End Cost Estimate		
	(a) Expected Sales Reduction	(b) Expected Post-Regulatory Sales	(c) Aggregate Lost Consumer Surplus (millions $)	(d) Expected Sales Reduction	(e) Expected Post-Regulatory Sales	(f) Aggregate Lost Consumer Surplus (millions $)
Bench	97,917	419,083	$11.02	297,231	219,769	$101.50
Contractor	9,098	69,902	$1.91	23,885	55,115	$13.14
Cabinet	3,813	51,187	$1.00	8,758	46,242	$5.28
Total	110,827	540,173	$13.92	329,874	321,126	$119.92

Table 10 presents the total costs per table saw, including the direct manufacturing costs, replacement part costs, and lost consumer surplus. The direct manufacturing and replacement part cost estimates, per table saw, are from table 8. The lost consumer surplus, per table saw, is calculated as the aggregate lost consumer surplus divided by the post-regulatory estimate of sales. Total per-unit costs range from roughly $388 to $1,210 per bench saw, from $531 to $1,376 per contractor saw, and from about $576 to $1,276 per cabinet saw.

Table 10. Total costs per saw

Table Saw Type	Low-End Cost Estimate			High-End Cost Estimate		
	Direct + Replacement (a)	Lost Consumer Surplus (b)	Total (c) = (a) + (b)	Direct + Replacement (d)	Lost Consumer Surplus (e)	Total (f) = (d) + (e)
Bench	$311	$26	$338	$749	$462	$1,210
Contractor	$504	$27	$531	$1,138	$238	$1,376
Cabinet	$556	$20	$576	$1,161	$114	$1,276

The annual aggregate costs of the rule are estimated in columns (c) and (f) of table 11, and range from about $208 million, based on the low-end cost estimates, to about $400 million, based on the high-end cost estimates. Bench saws account for about 68 percent of the total under the low-end estimates, and about 66 percent of the total under the high-end estimates.

Table 11. Annual Post-Regulatory Sales, Per-Unit Cost Estimates, and Aggregate Annual Costs of the Proposed Rule, by Cost Level and Table Saw Type

	Low-End Cost Estimates			High-End Cost Estimates		
Table Saw Type	(a) Annual Post-Regulatory Table Saw Sales	(b) Per Unit Rule Cost	(c) Aggregate Costs (millions $) (a × b)	(d) Annual Post-Regulatory Table Saw Sales Surplus)	(e)Per Unit Rule Cost	(f) Aggregate Costs (millions $) (d × e)
Bench	419,083	$338	$141.55	219,769	$1,210	$266.01
Contractor	69,902	$531	$37.13	55,115	$1,376	$75.84
Cabinet	51,187	$576	$29.47	46,242	$1,276	$58.98
Total	540,173		$208.15	321,126		$400.83

F. Relationship Between Benefits and Costs

Section 9(f)(3)(E) of the CPSA, 15 U.S.C. 2058(f)(3)(E), provides that before adopting a final rule under CPSA sections 7 and 9, the Commission must find "that the benefits expected from the rule bear a reasonable relationship to its costs." Although this SNPR does not establish a final rule, we nevertheless address that issue here and preliminarily conclude that the expected benefits of the proposed rule comfortably exceed its expected costs. The expected benefits and costs of the proposed rule by table saw type are presented in table 12. The net benefit estimates

suggest that the per-unit benefits exceed costs by a ratio of more than 3.5 to 1 using a 3 percent discount rate. Using a 3 percent discount rate, the estimated net benefits range from about $503 million to $1,326 million for bench saws, $241 million to $365 million for contractor saws, and $536 million to $629 million for cabinet saws.

Table 12. Estimated Net Benefits

Table Saw Type	Benefits per Saw (a)	Cost per Saw (Low Est - top, Hi Est. - bottom) (b)	Net Benefit per Saw (c) = (a) - (b)	Est. Annual Sales (d)	Aggregate Net Benefits (millions, $) (e) = (c) × (d)
Bench	$3,503	$338	$3,165	419,083	$1,327
		$1,210	$2,293		$504
Contractor	$5,750	$531	$5,218	69,902	$365
		$1,376	$4,374		$241
Cabinet	$12,865	$576	$12,289	51,187	$629
		$1,276	$11,590		$536

This general relationship is not altered with variations in some of the key parameters of the analysis, including variations in the expected product life of table saws, table saw sales, injury rates, and significant variations in the estimated costs of injuries. Furthermore, even if the Commission were to assume that the voluntary standards have been effective in reducing the number and severity of injuries, based on the findings from the 2017 Special Study, benefits would not be strongly negative and could be positive. The Regulatory Analysis Memo contains a discussion of costs and benefits under this assumption.[37]

G. Sensitivity Analysis

The results of the regulatory analysis demonstrate that the benefits of AIM technology substantially exceed costs under most plausible scenarios. This sensitivity analysis varies several of the key parameters to show the impact on per-unit net benefits.

1. Lower AIM Effectiveness

Net benefits decline modestly if it is assumed that AIM technology is only 70 percent effective at mitigating the societal costs of blade-contact injuries, rather than 90 percent. Net

[37] TAB A to Staff's Briefing Package.

benefits under this assumption are $272.92 per bench saw, $145.98 per contractor saw, and $357.45 per cabinet saw. Benefits remain substantially greater than costs.

2. Higher Replacement Parts Costs

PTI's comments in response to the 2017 NPR stated that CPSC staff substantially underestimated replacement part costs (*i.e.*, replacement of blade and brake cartridge following activation of an AIM system), and suggested that such costs were more likely to amount to about $36 annually, as opposed to the $11 per year estimated in the NPR.[38] The PTI estimates would increase the cost per table saw, and would also result in the costs of the proposed rule exceeding the benefits. Specifically, net benefits could result in amounts as low as -$270.24 per bench saw, -$70.26 per contractor saw, and -$82.86 per cabinet saw. Nevertheless, given that estimated gross benefits per saw range from approximately $3,500 to nearly $13,000, even the higher replacement parts costs suggested by PTI—which are not consistent with CPSC staff's analysis—result in total costs that bear a reasonable relationship to total benefits.

3. Variations in the Expected Product Life of Bench Saws

PTI commented in response to the 2017 NPR that staff's estimate that the expected product life of bench saws was 10 years was an overestimate; PTI stated that bench saws' actual expected product life was 7.5 years. *Id.* However, a shorter product life reduces the estimated number of bench saws in use while the number and cost of injuries remain the same, thereby increasing the per-unit annual benefit of reduced social costs. The combined effect is a small increase in per-saw benefits and net benefits.

H. Regulatory Alternatives

The Commission considered several alternatives to the proposed rule. These alternatives would mitigate the proposed rule's costs and potential disruptions in the marketplace. However, these alternatives would also reduce the expected benefits of the proposed rule.

[38] Comment by Susan M. Young for the Power Tool Institute, Inc., on U.S. Consumer Product Safety Commission, Table saw blade contact injuries: Notice of proposed rulemaking, (July 26, 2017), available at: regulations.gov.

1. Take No Regulatory Action

The Commission could end the regulatory proceeding for table saws if it concludes that a mandatory rule is no longer needed to address an unreasonable risk. We cannot estimate the benefits and costs that would be associated with this alternative, because the estimates would be affected by factors such as the extent to which manufacturers would introduce new AIM-equipped table saws in the absence of a requirement that they do so, the prices of any such table saws, and the rate at which consumers would choose to purchase such table saws. However, because the rate at which AIM technology would be adopted in the absence of a mandatory rule would probably be substantially lower than the rate under a mandatory rule, both the benefits and the costs of this alternative would be much lower than estimated for the proposed rule.

2. Later Effective Dates

The proposed rule includes an effective date of 36 months after the final rule is published in the *Federal Register.* This is a lengthy period of time, particularly given Congress's instruction that consumer product safety rules adopted under sections 7 and 9 of the CPSA ordinarily should take effect within 30 to 180 days. 15 U.S.C. 2058(g)(1). Nevertheless, an effective date even later than 36 months could help reduce the impact of the rule on manufacturers by allowing them additional time to spread the costs of the redesign, and would also allow additional time for new entrants into the market. A later effective date might especially benefit manufacturers of bench saws because of the added technical difficulties in engineering small bench saws to incorporate AIM technology.

Although later effective dates could mitigate the impact of the proposed rule for some manufacturers, it could also delay a market-wide distribution of table saws with AIM technology. Given the net benefits per unit expected from incorporating AIM technology, delaying the effective date of the proposed rule would also delay the expected benefits of the rule.

3. Exempt Contractor and Cabinet Saws from a Product Safety Rule

The Commission could exempt cabinet and contractor saws on the grounds that, while widely purchased and used by consumers, they are generally intended for professional, commercial, or industrial users. Exempting cabinet and contractor saws could substantially reduce the adverse impact of the rule on small manufacturers because most small manufacturers market contractor and cabinet saws. Under this alternative, however, the benefits and costs would be limited to those associated with bench saws, which account for approximately 60.9 percent of medically treated blade-contact injuries. Thus, more than a third of medically treated blade-contact injuries would remain unaddressed under this alternative.

4. Limiting Applicability of Performance Requirements to Some, But Not All, Table Saws

Rather than requiring all table saws of each manufacturer to meet the requirements of the proposed standard, the Commission could require that only a subset of table saws do so. For example, if a firm produces bench saws and contractor saws, the Commission might require the firm to produce at least one bench saw model and one contractor saw model that meet the requirements of the standard. However, this option would only address a portion of total injuries. In addition, a rule of this sort might be somewhat more difficult to enforce than a requirement that all table saws contain the AIM technology.

5. Information and Education Campaign

The Commission could conduct an information and education campaign informing consumers about blade contact hazards and blade contact injuries, and the benefits of AIM technology. The Commission could also strongly encourage consumers to always use the passive safety devices required under the voluntary standard, especially if they choose not to purchase a table saw with the AIM technology. This alternative could be implemented on its own, in the absence of other regulatory options, or it could be implemented in combination with any of the alternative options.

However, the effectiveness of warnings and instructions is limited, because they depend on consumers not only receiving and understanding the message, but also being persuaded to

heed the message. Although such a campaign could help inform consumers, the Commission preliminarily concludes based on the severity of injuries and recurring hazard patterns of blade-contact injuries, coupled with the high societal costs of these injuries, that a performance requirement is necessary to reduce the unreasonable risk of blade-contact injuries.

XI. Updated Initial Regulatory Flexibility Analysis

This section provides an analysis of the impact the proposed rule would have on small businesses. Whenever an agency is required to publish a proposed rule, section 603 of the Regulatory Flexibility Act (RFA) requires that the agency prepare an initial regulatory flexibility analysis (IRFA) that describes the impact that the rule would have on small businesses and other entities. 5 U.S.C. 603. An IRFA is not required if the head of an agency certifies that the proposed rule will not have a significant economic impact on a substantial number of small entities. 5 U.S.C. 605. The IRFA must contain:

(1) a description of why action by the agency is being considered;

(2) a succinct statement of the objectives of, and legal basis for, the proposed rule;

(3) a description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;

(4) a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and

(5) identification to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule.

An IRFA must also contain a description of any significant alternatives that would accomplish the stated objectives of the applicable statutes and that would minimize any significant economic impact of the proposed rule on small entities. According to the IRFA, alternatives could include: (1) differing compliance or reporting requirements that take into

account the resources available to small businesses; (2) clarification, consolidation, or simplification of compliance and reporting requirements for small entities; (3) use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part of the rule thereof, for small entities. The alternatives the Commission considered are discussed in section X of this preamble.

The IRFA prepared by CPSA staff is contained in TAB B of staff's briefing package, and is summarized below.

A. Reason for Agency Action

The proposed rule for table saws would reduce an unreasonable risk of injury associated with blade-contact injuries on table saws. CPSC staff estimate that there were an average of approximately 32,000 emergency department-treated blade-contact injuries annually from 2004 to 2020. AIM technology has been shown to significantly mitigate the severity of injuries caused by a victim's finger, hand, or other body part contacting the blade while the table saw is in operation. Accordingly, the proposed rule would establish a mandatory performance requirement to address the risk of injuries associated with blade-contact injuries on table saws.

B. Objective of and Legal Basis for the Proposed Rule

The objective of the proposed rule is to reduce the risk of serious injuries resulting from blade contact on table saws. The Commission published an ANPR in October 2011, which initiated this proceeding to evaluate regulatory options and potentially develop a mandatory standard to address the risks of blade-contact injuries associated with the use of table saws, and the Commission published an NPR in 2017. The proposed rule would be promulgated under the authority of the CPSA.

C. Small Entities to Which the Proposed Rule Will Apply

The proposed rule would apply to manufacturers, importers, and private labelers of table saws that are sold in the United States. As of March 2023, CPSC is aware of 23 firms that supply table saws to the U.S. market. Of these 23 firms, seven are small according to criteria

established by the Small Business Administration (SBA). According to the SBA criteria, a table saw manufacturer is considered small if it has fewer than 500 employees, and a table saw importer is considered small if it has fewer than 100 employees. Private labelers of table saws are considered small if their annual revenue does not exceed $41.5 million in the case of home centers, $35 million in the case of department stores, and $8 million in the case of hardware stores.

Although the design and engineering of table saws may occur in the United States, most U.S. based suppliers contract the production of table saws to foreign manufacturers, generally in Taiwan or China. Shopsmith, the manufacturer of a multipurpose machine that includes a table saw, is the only small business believed to manufacture its product in the United States.

D. Compliance, Reporting, and Record Keeping Requirements of the Proposed Rule

The proposed rule would require that all table saws incorporate an AIM technology that will reduce the risk of severe injury if the finger, hand, or other body part comes into contact with the blade while the saw is in operation. In particular, the rulemaking would require that a table saw cut no deeper than 3.5 mm into a test probe that approaches a spinning saw blade at a rate of 1 m/s before contacting the blade. The proposed rule sets out a performance requirement rather than a design standard; it does not specify the manner in which the table saw must meet this safety requirement. If a final rule is issued, manufacturers must certify pursuant to section 14 of the CPSA that the product conforms to the standard, based on either a test of each product or any reasonable method to demonstrate compliance with the requirements of the standard. For products that manufacturers certify, manufacturers would issue a general certificate of conformity (GCC).

Section 14 of the CPSA sets forth the requirements for GCCs. Among other requirements, each certificate must identify the manufacturer or private labeler issuing the certificate and any third party conformity assessment body on whose testing the certificate depends, the place of manufacture, the date and place where the product was tested, each party's

name, full mailing address, telephone number, and contact information for the individual responsible for maintaining records of test results. The certificate must be in English. Certificates must be furnished to each distributor or retailer of the product and to the CPSC, if requested.[39]

1. Costs of Proposed Rule that Would Be Incurred by Small Manufacturers

To comply with the proposed rule, table saw manufacturers would need to license or develop an AIM technology. To license a technology, manufacturers typically pay a royalty or license fee to the owner of the patents on the technology. At this time CPSC is not able to estimate the royalty cost for licensing an AIM technology.

If a manufacturer wished to avoid fees, the manufacturer would have the challenge of developing its own AIM technology that does not infringe on an existing patent. At a minimum, such an effort would likely cost at least several hundred thousand dollars and perhaps several million dollars, based on the estimated costs of developing the existing technologies.

According to several manufacturers, incorporating AIM technology would require a redesign of each table saw model. Estimates of the redesign and retooling costs ranged from about $100,000 to $700,000 per model. The redesign and retooling process would be expected to take 1 to 3 years depending on the number and severity of problems encountered in the process. The redesign and retooling costs for subsequent models could be less than the costs associated with the first model.

In addition to the redesign and retooling costs, there would be costs for the additional components needed to incorporate an AIM technology. Depending upon the specific system, additional parts may include a brake cartridge; cables, parts, or brackets to secure the brake cartridge; electrodes and assemblies; and a power supply or motor control. CPSC estimates that

[39] The regulations governing the content, form, and availability of the certificates of compliance are codified at 16 CFR 1110.

these additional components would increase the manufacturing cost of a table saw by between $58 and $74.

2. Impacts on Small Businesses

Most small manufacturers are expected to license an AIM technology instead of developing their own technology. The costs of developing their own AIM technology would likely be too high for most small manufacturers, especially given the challenge of developing a technology that did not infringe upon an existing patent. However, there is no certainty that small manufacturers would be able to negotiate acceptable licensing agreements with TTS or another patent holder. If small manufacturers are unable to negotiate acceptable licensing agreements for AIM technology, it is likely they would exit the U.S. table saw market.

If a small table saw manufacturer is able to license AIM technology, it would have to determine whether each table saw model would remain profitable after redesigning it with AIM technology. Further, small table saw manufacturers that are able to license the AIM technology from TTS or another table saw manufacturer would pay royalties to a competitor. This could reduce their competitiveness in the table saw market.

Most small manufacturers of table saws also supply other types of woodworking or metal working equipment. Information provided by firms suggests that U.S. sales of table saws account for a small percentage of the total revenue of most small firms. One manufacturer suggested that U.S. table saw sales accounted for about 1 percent of the firm's total revenue. Two other firms estimated that U.S. table saw sales accounted for between 5 and 8 percent of their total revenue. IEc, 2016a. Actions that impact a firm's revenue by more than 1 percent are potentially significant. Given that small table saw manufacturers have expressed they may drop one or more table saw models or leave the market entirely if the proposed rule is adopted, the proposed rule could have a significant impact on small manufacturers.

E. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rule

The Occupational Safety and Health Administration (OSHA) has established standards that cover woodworking equipment used in workplace settings, rather than by consumers. These standards are codified at 29 CFR 1910. Generally, these requirements cover workplace safety and the use of safety devices such as blade guards and hoods. Currently, OSHA standards do not mandate performance requirements that would use AIM technology on table saws that are used by consumers. Accordingly, the Commission has not identified any Federal rules that duplicate or conflict with the proposed rule.

F. Alternatives Considered to Reduce the Burden on Small Entities

Under section 603(c) of the Regulatory Flexibility Act, an initial regulatory flexibility analysis must "contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of the applicable statutes and which minimize any significant impact of the proposed rule on small entities." CPSC examined several alternatives to the proposed rule that could reduce the impact on small entities. These alternatives are discussed in section X of this preamble.

G. Comments Filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA) in Response to 2017 NPR

Pursuant to 5 U.S.C. 604, a final regulatory flexibility analysis contained in a final rule must include the agency's response to any comments filed by the Chief Counsel for Advocacy of the SBA in response to a proposed rule, and a detailed statement of any change made to the proposed rule as a response to the comments. Although there is no such requirement for an IRFA, staff's separate regulatory flexibility analysis memorandum[40] includes a summary of the significant issues raised in the Chief Counsel's comments on the 2017 NPR. None of the comments by SBAA resulted in CPSC staff recommending changes to the proposed rule.

XII. Environmental Considerations

[40] TAB B of Staff's Briefing Package.

Generally, the Commission's regulations are considered to have little or no potential for affecting the human environment, and environmental assessments and impact statements are not usually required. *See* 16 CFR 1021.5(a). The final rule is not expected to have an adverse impact on the environment and is considered to fall within the "categorical exclusion" for purposes of the National Environmental Policy Act. 16 CFR 1021.5(c).

XIII. Preemption

In accordance with Executive Order 12988 (February 5, 1996), the CPSC states the preemptive effect of the proposed rule, as follows:

The regulation for addressing blade-contact injuries on table saws is proposed under authority of the CPSA. 15 U.S.C. 2051–2089. Section 26 of the CPSA provides that:

> whenever a consumer product safety standard under this Act is in effect and applies to a risk of injury associated with a consumer product, no State or political subdivision of a State shall have any authority either to establish or to continue in effect any provision of a safety standard or regulation which prescribes any requirements as to the performance, composition, contents, design, finish, construction, packaging or labeling of such product which are designed to deal with the same risk of injury associated with such consumer product, unless such requirements are identical to the requirements of the Federal Standard.

15 U.S.C. 2075(a). Thus, this proposed rule would preempt non-identical state or local requirements for table saws that are designed to protect against the same risk of injury, *i.e.*, injuries associated with blade contact.

Upon application to the Commission, a state or local standard may be excepted from this preemptive effect if the state or local standard: (1) provides a higher degree of protection from the risk of injury or illness than the CPSA standard, and (2) does not unduly burden interstate commerce. In addition, the Federal Government, or a state or local government, may establish or continue in effect a non-identical requirement for its own use that is designed to protect against the same risk of injury as the CPSC standard if the Federal, State, or local requirement provides a higher degree of protection than the CPSA requirement. 15 U.S.C. 2075(b).

XIV. Certification

Section 14(a) of the CPSA requires that products subject to a consumer product safety rule under the CPSA, or to a similar rule, ban, standard or regulation under any other act enforced by the Commission, must be certified as complying with all applicable CPSC-enforced requirements. 15 U.S.C. 2063(a). A final rule addressing blade-contact injuries on table saws would subject table saws to this certification requirement.

XV. Paperwork Reduction Act

This proposed rule contains information collection requirements that are subject to public comment and review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (PRA). 44 U.S.C. 3501–3520. We describe the provisions in this section of the document with an estimate of the annual reporting burden. Our estimate includes the time for gathering certificate data and creating General Certificates of Conformity (GCC), keeping and maintaining records associated with the GCCs, and disclosure of GCCs to third parties.

CPSC particularly invites comments on: (1) whether the collection of information is necessary for the proper performance of the CPSC's functions, including whether the information will have practical utility; (2) the accuracy of the CPSC's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (3) ways to enhance the quality, utility, and clarity of the information to be collected; (4) ways to reduce the burden of the collection of information on respondents, including the use of automated collection techniques, when appropriate, and other forms of information technology; and (5) estimated burden hours associated with label modification, including any alternative estimates.

Title: *Safety Standard Addressing Blade-Contact Injuries on Table Saws*

Description: The proposed rule would require table saws, when powered on, to limit the depth of cut to 3.5 millimeters when a test probe, acting as a surrogate for a human body part, contacts the spinning blade at an approach rate of 1 meter per second.

Description of Respondents: Persons who manufacture or import table saws.

Staff estimates the burden of this collection of information as follows in table 13:

Table 13. Estimated Annual Reporting Burden

Burden Type	Number of Respondents	Frequency of Response	Total Annual Responses	Minutes per Response	Total Burden Hours	Annual Cost
GCC Creation	23	7	161	5	13.42	$921.28
Recordkeeping	23	7	161	1.25	3.35	$105.36
Third Party Disclosure	23	7	161	15	40.25	$1,265.86
Total Burden	**69**	**–**	**483**	**–**	**57.02**	**$2,292.50**

The proposed rule would require that manufacturers certify that their products conform to the rule and issue a GCC. As of March 2023, CPSC is aware of 23 firms that supply table saws to the U.S. market. Accordingly, we estimate there are 23 respondents that will respond to the collection annually. On average, each respondent may gather certificate data and create 7 certificates for complying table saws in the market. The time required to issue a GCC is conservatively estimated as about 5 minutes (although the actual time required is often substantially less). Therefore, the estimated burden associated with issuance of GCCs is 13.42 hours (161 responses × 5 minutes per response = 805 minutes or 13.42 hours). Staff estimates the hourly compensation for the time required to issue GCCs is $68.65 (U.S. Bureau of Labor Statistics, "Employer Costs for Employee Compensation," March 2023, table 4, Private industry management, professional and related occupations: https://www.bls.gov/news.release/archives/ecec_06162023.pdf). Therefore, the estimated annual cost to industry associated with issuance of a GCC is $921.28 ($68.65 per hour × 13.42 hours = $921.283).

For purposes of this burden analysis, we assume that the records supporting GCC creation, including testing records, would be maintained for a five-year period. Staff estimates

burden of 1.25 minutes per year in routine recordkeeping. This adds up to approximately 3.35 hours (161 responses × 1.25 minutes per response = 201.25 minutes or 3.35 hours). Staff estimates the hourly compensation for the time required to maintain records is $31.45 (U.S. Bureau of Labor Statistics, "Employer Costs for Employee Compensation," March 2023, table 4, Private industry sales and office occupations: https://www.bls.gov/news.release/archives/ecec_06162023.pdf). Therefore, the estimated annual burden cost associated with recordkeeping of GCCs is $105.36 ($31.45 per hour × 3.35 hours = $105.3575).

The rule would also require that GCCs be disclosed to third party retailers and distributors. Staff estimates another 161 third party disclosure responses, each one of which requires 15 minutes per year. This adds up to 2,415 minutes (161 responses × 15 minutes per response = 2,415 minutes) or 40.25 hours. Staff uses an hourly compensation for the time required to disclose certificates to third parties of $31.45 (U.S. Bureau of Labor Statistics, "Employer Costs for Employee Compensation," March 2023, table 4, Private industry sales and office occupations: https://www.bls.gov/news.release/archives/ecec_06162023.pdf). Therefore, the estimated annual burden cost associated with third party disclosure of GCCs is $1,265.86 ($31.45 per hour × 40.25 hours = $1,265.8625).

Based on this analysis, CPSC estimates the annual PRA burden associated with the rule at 57.02 hours (13.42 hours + 3.35 hours + 40.25 hours) with a total burden cost of $2,292.50 ($921.28 + $105.36 + $1,265.86). There are no operating, maintenance, or capital costs associated with the collection.

As required under the PRA (44 U.S.C. 3507(d)), CPSC has submitted the information collection requirements of this proposed rule to the OMB for review. Interested persons are requested to submit comments regarding information collection by **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, to the Office of

Information and Regulatory Affairs, OMB as described under the **ADDRESSES** section of this document.

XVI. Effective Date

Section 9(f)(3) of the CPSA provides that a rule issued under sections 7 and 9, "including its effective date," must be "reasonably necessary to eliminate or reduce an unreasonable risk injury associated with such product." 15 U.S.C. 2058(f)(3). Section 9(g)(1) addresses effective dates in greater detail and requires that the effective date shall not exceed 180 days from the date the rule is promulgated, "unless the Commission finds, for good cause shown, that a later effective date is in the public interest and publishes its reasons for such finding." 15 U.S.C. 2058(g)(1). Similarly, the effective date must not be less than 30 days after promulgation "unless the Commission for good cause shown determines that an earlier effective date is in the public interest."

The Commission here proposes to find good cause in the public interest to extend the effective date of this rulemaking beyond the statutory range of 30 to 180 days, and to make the rulemaking effective 36 months from the date of publication of the final rule. The rule would apply to all table saws manufactured after the effective date. 15 U.S.C. 2058(g)(1). This effective date is being proposed in light of the unusual market conditions presented here, where the proposed safety rule requires use of advanced technologies that are capable of being supplied competitively, but currently are dominated by a single supplier. The proposed effective date is intended to allow time for development of both existing and new AIM technologies and establishment of commercial arrangements for licensing those technologies. It thereby addresses the concerns about potential unavailability of AIM solutions at affordable cost that some commenters raised in response to the NPR. In addition, this extended effective date would allow manufacturers to spread over a 36-month period the costs of modifying the design of their table saws to incorporate AIM technology, and retooling their factories to produce table saws with the

new technology. Finally, it would allow additional time for new entrants into the U.S. table saw market.

XVII. Proposed Findings

The CPSA requires the Commission to make certain findings when issuing a consumer product safety standard. 15 U.S.C. 2058(f)(1), (f)(3). The proposed findings for this proposed rule are stated in the appendix for proposed part 1264 and are based on information provided throughout this preamble. While the proposed findings are largely similar to those proposed in the 2017 NPR, they reflect newly available information.

XVIII. Request for Comments

We invite all interested persons to submit comments on any aspect of the proposed rule. The Commission specifically seeks comments on the following topics:

A. Scope

- Whether certain types of table saws, such as mini or micro tables saws, or table saws that are used primarily for commercial or industrial use, should be excluded from the scope of the rule;
- Whether the scope of the rule should be expanded to include types of saws other than table saws that may present a similar blade-contact hazard (*e.g.,* tile saws);
- Whether the definition of table saws should be revised, or whether other definitions are necessary; and
- Home-made table saws or other dangerous alternatives consumers may pursue if they are unwilling or are unable to purchase a table saw with AIM capabilities.

B. Market Information

- Table saw sales by table saw type (bench, contractor, and cabinet), and information on the expected product life of each type of table saw;

- Opportunities to develop or otherwise obtain access to AIM technology for table saws, the time required to realize those opportunities, related barriers to access, and the anticipated cost of obtaining access to AIM technology; and
- The cost of AIM components, estimates of development and retooling costs, and expected time requirements to complete the development and retooling processes, including with respect to battery powered table saws.

C. Utility

- What impacts AIM technology may have on the utility of table saws for consumers.

D. Effectiveness

- The effectiveness of AIM technologies. CPSC estimates that the requirements of the proposed rule would reduce the societal costs of blade-contact injuries by approximately 90 percent. The Commission seeks comments from the public on this estimate;
- The extent to which table saws are used for cutting wet wood or conductive materials such as non-ferrous metals;
- The extent to which the AIM technology may be bypassed; and
- The extent to which consumers may switch to alternative, potentially unsafe methods to cut wood if table saws are required to be equipped with AIM technology.

E. Manufacturing Costs

- Information on manufacturing costs. The Commission seeks comments that would allow us to make more precise estimates with respect to the cost impact of a rule requiring the use of AIM technology on table saws; and
- The feasibility of incorporating AIM technology into the design of small benchtop table saws, including battery powered benchtop table saws.

F. Test Requirements

- How different detection methods may be applied as part of an AIM system, and appropriate test methods to properly evaluate the triggering of AIM systems employing these detection methods;
- Studies or tests that have been conducted to evaluate AIM technology in table saws; and
- Studies, research, or tests on the speed of the human hand/finger while woodworking and during actual blade-contact incidents, in particular.

G. Regulatory Alternatives

- Whether a 36-month effective date for the proposed rule is reasonable, or whether a longer or shorter effective date is warranted;
- The feasibility of limiting or exempting a type or subset of table saws from the proposed rule; and
- The potential impact of the proposed rule on small entities, especially small businesses.

H. Anti-stockpiling

- The limits on manufacturing or exporting contained in the proposed rule's anti-stockpiling provision; and
- The anti-stockpiling provision's base period.

Comments should be submitted in accordance with the instructions in the **ADDRESSES** section at the beginning of this document.

XIX. Notice of Opportunity for Oral Presentation

Section 9 of the CPSA requires the Commission to provide interested parties "an opportunity for oral presentation of data, views, or arguments." 15 U.S.C. 2058(d)(2). The Commission must keep a transcript of such oral presentations. *Id.* Any person interested in making an oral presentation must contact the Commission, as described under the **DATES** and **ADDRESSES** section of this document.

XX. Promulgation of a Final Rule

Section 9(d)(1) of the CPSA requires the Commission to promulgate a final consumer product safety rule within 60 days of publishing a proposed rule. 15 U.S.C. 2058(d)(1). Otherwise, the Commission must withdraw the proposed rule if it determines that the rule is not reasonably necessary to eliminate or reduce an unreasonable risk of injury associated with the product or is not in the public interest. *Id.* However, the Commission can extend the 60-day period, for good cause shown, if it publishes the reasons for doing so in the Federal Register. *Id.*

The Commission finds that there is good cause to extend the 60-day period for this rulemaking. Under both the APA and the CPSA, the Commission must provide an opportunity for interested parties to submit written comments on a proposed rule. 5 U.S.C. 553; 15 U.S.C. 2058(d)(2). The Commission is providing 60 days for interested parties to submit written comments. A shorter comment period may limit the quality and utility of information CPSC receives in comments, particularly for areas where it seeks data and other detailed information that may take time for commenters to compile. Additionally, the CPSA requires the Commission to provide interested parties with an opportunity to make oral presentations of data, views, or arguments. 15 U.S.C. 2058. This requires time for the Commission to arrange a public meeting for this purpose and provide notice to interested parties in advance of that meeting, if any interested party requests the opportunity to present such comments. After receiving written and oral comments, CPSC staff must have time to review and evaluate those comments.

These factors make it impractical for the Commission to issue a final rule within 60 days of this proposed rule. Moreover, issuing a final rule within 60 days of the NPR may limit commenters' ability to provide useful input on the rule, as well as CPSC's ability to evaluate and take that information into consideration in developing a final rule. Accordingly, the Commission finds that there is good cause to extend the 60-day period for promulgating the final rule after publication of the proposed rule.

XXI. Conclusion

For the reasons stated in this preamble, the Commission proposes requirements to address an unreasonable risk of injury associated with table saws.

List of Subjects

16 CFR Part 1264

Consumer protection, Imports, Information, Safety, Table saws.

For the reasons discussed in the preamble, the Commission proposes to add part 1264 to title 16 of the Code of Federal Regulations as follows:

PART 1264—SAFETY STANDARD FOR BLADE-CONTACT INJURIES ON TABLE SAWS

Sec.

Authority: 15 U.S.C. 2056, 2058 and 2076.

§ 1264.1 Scope, purpose and effective date.

(a) This part, a consumer product safety standard, establishes requirements for table saws, as defined in § 1264.2. These requirements are intended to reduce an unreasonable risk of injury associated with blade-contact injuries on table saws.

(b) Any table saw manufactured after [effective date of final rule] shall comply with the requirements stated in § 1264.3.

§ 1264.2 Definitions.

In addition to the definitions in section 3 of the Consumer Product Safety Act (15 U.S.C. 2051), the following definition applies for purposes of this part:

Table saw means a woodworking tool that has a motor-driven circular saw blade, which protrudes through the surface of a table. Table saws include bench saws, jobsite saws, contractor

saws, hybrid saws, cabinet saws, and sliding saws. Table saws may be powered by alternating current from a wall outlet or direct current from a battery.

§ 1264.3 Requirements.

(a) *General.* All table saws covered by this standard shall meet the requirements stated in paragraph (b) of this section.

(b) *Test.* All table saws, when powered on, must limit the depth of cut to no more than 3.5 mm when the center axis of a test probe is moving parallel to, and 15 ± 2 mm above, the tabletop at a rate of 1 meter per second, and contacts a spinning saw blade that is set at its maximum height setting.

(c) *Test Probe.* The test probe shall act as the surrogate for a human body/finger and allow for the accurate measurement of the depth of cut to assess compliance with paragraph (b) of this section.

§ 1264.4 Test procedures.

Any test procedure that will accurately determine compliance with the standard may be used.

§ 1264.5 Prohibited stockpiling.

(a) *Base period.* The base period for table saws is the 12-month period immediately preceding the promulgation of the final rule.

(b) *Prohibited acts.* Manufacturers and importers of table saws shall not manufacture or import table saws that do not comply with the requirements of this part in any 12-month period between [date of promulgation of the final rule] and [effective date of the final rule] at a rate that is greater than 115 percent of the rate at which they manufactured or imported table saws during the base period.

Appendix to Part 1264 – Findings Under the Consumer Product Safety Act

The Consumer Product Safety Act requires that the Commission, in order to issue a standard, make the following findings and include them in the rule. 15 U.S.C. 2058(f)(3).

(a) Degree and Nature of the Risk of Injury

In 2017, there were an estimated 26,500 table saw blade-contact, emergency department treated injuries. Of these, an estimated 25,600 injuries (96. 4 percent) involved the finger. The most common diagnoses in blade-contact injuries were lacerations (approximately 16,100 injuries, or 60.9 percent of total injuries), fractures (approximately 5,500 injuries, or 20.6 percent), and amputations (approximately 2,800 injuries, or 10.7 percent).

On a broader scale, NEISS data collected by CPSC staff indicates that, from 2010 to 2021, there were an average of approximately 30,600 table saw blade-contact injuries per year. Staff determined that there was no discernible change in the pattern of blade-contact injuries or types of injuries over this period and detected no statistically significant downward trend over the period. Staff also conducted a trend analysis to include the rate of injury per 10,000 table saws in use for each year in the analysis. The analysis suggested that there was no discernible change in the risk of injury associated with blade contact related to table saws over this period, despite the transition of the market to modular blade guards and riving knives to meet voluntary standard requirements intended to reduce blade-contact injuries.

(b) Number of Consumer Products Subject to the Rule

The number of table saws in use was estimated with the CPSC's Product Population Model (PPM), a statistical model that projects the number of products in use given examples of annual product sales and product failure rates. Total annual shipments of all table saws to the U.S. market from 2002 to 2017 ranged from 429,000 to 825,000, and total annual shipments from 2018 to 2020 are estimated to have ranged from 746,000 to 995,000. CPSC staff estimated that bench saws account for about 79 percent of the units sold and have an average product life of 10 years; contractor saws (including hybrids) account for 12 percent of the units sold and have an average product life of 17 years; and cabinet saws account for approximately 9 percent of the units sold and have an average product life of 24 years. Based on this information, staff projected that a total of about 8.2 million table saws were in use in the United States in 2017,

including about 5.35 million bench saws (about 65.25 percent), 1.4 million contractor saws (about 17.1 percent), and 1.46 million cabinet saws (about 17.65 percent).

(c) Need of the Public for the Product and Probable Effect on Utility, Cost, and Availability

Consumers commonly purchase table saws for the straight sawing of wood and other materials, and more specifically, to perform rip cuts, cross cuts, and non-through cuts. Because operator finger/hand contact with the table saw blade is a dominant hazard pattern, the performance requirement would limit the depth of cut and significantly reduce the frequency and severity of blade-contact injuries on table saws.

However, the rule will increase table saw production costs. CPSC expects that the prices for the least expensive bench saws now available would more than double, to $400 or more. In general, the retail prices of bench saws could increase by as much as $285 to $700 per unit, and the retail prices of contractor and cabinet saws could rise by as much as $450 to $1,080 per unit. These higher prices may be mitigated in the longer run, but the extent of any future mitigation is unknown.

Because of the likely decline in sales following the promulgation of a rule, consumers who choose not to purchase a new table saw due to the higher price will experience a loss in utility by forgoing the use of table saws, or because they will continue to use older saws that they would have preferred to replace. There may also be some other impacts on utility, such as an increase in the weight and (potentially) the size of table saws. This factor may have a relatively small impact on the heavier and larger contractor and cabinet saws but could reduce the portability of some of the smaller and lighter bench saws.

(d) Other Means to Achieve the Objective of the Rule, While Minimizing the Impact on Competition and Manufacturing

The Commission considered alternatives to the rule. For example, the Commission considered not taking regulatory action, deferring to the voluntary standard development process,

exempting or limiting certain table saws from regulation, extending the rule's effective date, and relying on information and education campaigns. However, the Commission finds that these alternatives would not adequately mitigate the unreasonable risk of blade-contact injuries on table saws.

(e) Rule and Effective Date are Reasonably Necessary to Eliminate or Reduce Unreasonable Risk of Injury

CPSC estimates that 26,500 table saw-related injuries involving blade contact were treated in hospital emergency departments in 2017. Based on this estimate of blade-contact injuries initially treated in hospital EDs, CPSC's injury cost model projects an additional 22,675 blade-contact injuries treated in other treatment settings. Thus, there was an estimated annual total of about 49,176 medically treated blade-contact injuries in 2017. An estimated 96.4 percent of these injuries involved the finger. The most common diagnoses in blade-contact injuries are laceration injuries, fractures, amputations, and avulsion. Thousands of amputations (an estimated 2,800 injuries in 2017 alone) occur each year on table saws. When compared to all other workshop products, table saws account for an estimated 52.4 percent of all amputations related to workshop products in 2015.

Existing safety devices, such as the blade guard and riving knife, do not adequately reduce the number or severity of blade-contact injuries on table saws. Table saws have been equipped with these passive safety devices since 2010, and there is no evidence that these safety devices have adequately reduced or mitigated blade-contact injuries. In CPSC's 2017 Special Study, an analysis of each individual case provided anecdotal information on the usage of modular and traditional blade guards. Overall, of the estimated 26,500 table saw blade-contact injuries treated in emergency departments in 2017, the blade guard was not in use in an estimated 88.9 percent of injuries (23,600). Anecdotally, the blade guard was not in use for 89.2 percent of the cases (91 of 102 cases) involving table saws equipped with traditional blade guards, and the

blade guard was not in use in 88.0 percent of the cases (22 of 25 cases) involving table saws equipped with modular blade guards.

CPSC's trend analysis of the annual estimated number of emergency department-treated injuries associated with table saws covered two timespans after the voluntary standard implemented the requirement for riving knives and modular blade guards on table saws (2010 to 2021 and 2015 to 2021). The data showed that there was no discernible change in the number of injuries or types of injuries associated with table saw blade contact over either of the analyzed periods. A trend analysis to assess the risk of injury per 10,000 table saws in use also showed there was no discernible change in the risk of injury associated with table saw blade contact over the analyzed time periods.

The net benefits for the proposed rule would range from approximately $3,153 per bench saw to approximately $11,597 per cabinet saw over each unit's expected product life. Aggregate net benefits over approximately 1 year's production and sale of table saws could, across all categories of table saws, range from about $1.28 billion to $2.32 billion.

The proposed rule includes an effective date of 36 months. The Commission considered a later effective date to mitigate the impact of the proposed rule for some manufacturers, but a later date could also delay a market-wide distribution of table saws with AIM technology. Given the net benefits expected from incorporating AIM technology, delaying the effective date of the proposed rule would also delay the expected benefits of the rule.

The Commission concludes that there is an unreasonable risk of injury associated with blade-contact injuries on table saws and finds that the rule and the effective date is reasonably necessary to reduce that unreasonable risk of injury.

(f) Public Interest

This rule is intended to address an unreasonable risk of blade-contact injuries on table saws. The rule would reduce and mitigate the severity of blade-contact injuries on table saws in the future; thus, the rule is in the public interest.

(g) Voluntary Standards

The current voluntary standard for table saws is Underwriters Laboratories Inc. (UL) 62841-3-1, *Electric Motor-Operated Hand-Held Tools, Transportable Tools and Lawn and Garden Machinery Part 3-1: Particular Requirements for Transportable Table Saws*. This standard specifies that table saws shall be provided with a modular blade guard and riving knife.

The voluntary standard does not adequately address blade-contact injuries on table saws. There has been no statistically significant reduction in the number or severity of blade-contact injuries from 2008 to 2021. The relevant voluntary standards began requiring tables saws to include modular blade guard systems in 2010. In addition, available data indicates that a large percentage of table saw users encounter circumstances in which blade guards must be removed in order to effectively use their saws, and at least 100 known blade-contact injuries involving table saws equipped with modular blade guard systems have occurred.

(h) Reasonable Relationship of Benefits to Costs

Based on CPSC staff's analysis of NEISS data and the CPSC's Injury Cost Model (ICM), the Commission finds that the rule would address an estimated 49,176 medically treated blade-contact injuries annually. The societal costs of these injuries (in 2021 dollars and using a 3 percent discount rate) amounted to about $3.97 billion in 2021. Overall, medical costs and work losses account for about 31 percent of these costs, or about $1.2 billion. The intangible costs associated with pain and suffering account for the remaining 69 percent of injury costs.

Increased manufacturing costs, as well as the expected costs of replacement parts for the AIM system, would range from about $338 to $1,210 per bench saw, about $531 to $1,376 per contractor saw, and about $576 to $1,276 per cabinet saw. These costs likely would be mitigated

somewhat over time, but the extent of any future mitigation is unknown. Based on one year's production and sale of table saws, aggregate gross costs could range from about $208 million to $400 million annually. In addition to these direct manufacturing and replacement parts costs, many firms would likely need to pay royalty fees to patent holders for the AIM technology, which CPSC estimates could amount to approximately 8 percent of saws' wholesale price.

Additionally, some consumers who would have purchased table saws at the lower pre-regulatory prices will likely choose not to purchase new table saws due to price increases. The cost impact of the proposed rule on market sales may reduce aggregate sales by as much as 17 percent to 50 percent annually. The decline in sales would result in lost utility to consumers who choose not to purchase table saws because of the higher prices. Further reductions in consumer utility may result from the added weight, and hence, reduced portability associated with addition the AIM technology on table saws.

Nevertheless, because of the substantial societal costs attributable to blade-contact injuries (nearly $4 billion annually), and the expected high rate of effectiveness of the rule in preventing those injuries, the estimated aggregate net benefits are expected to range from about $1.28 billion to $2.32 billion annually. Therefore, the Commission concludes that the benefits expected from the rule bear a reasonable relationship to its costs.

(i) Least Burdensome Requirement That Would Adequately Reduce the Risk of Injury

The Commission considered less burdensome alternatives to the proposed rule addressing blade-contact injuries on table saws and concluded that none of these alternatives would adequately reduce the risk of injury.

(1) *Take no regulatory action.* The Commission considered not taking any regulatory action. Under this alternative, table saws would continue to use existing passive safety devices, such as blade guards, riving knives, and anti-kickback pawls. Additionally, table saws with the AIM technology are already available for consumers who want and can afford them, albeit to a

limited extent. However, not taking any action would leave the unreasonable risk of blade-contact injuries on table saws unaddressed. Based on the severity of injuries and recurring hazard patterns of blade-contact injuries, the absence of any statistically significant decline in those injuries over time, inaction by voluntary standards organizations to address the blade-contact hazard effectively, and the high societal costs of these injuries, the Commission believes a performance requirement is necessary to reduce the unreasonable risk of blade-contact injuries on all table saws.

(2) *Later effective date.* The proposed rule would require an effective date that is 36 months after the final rule is published in the *Federal Register*. An effective date later than 36 months could further reduce the impact of the rule on manufacturers because it would allow them additional time to benefit from the development of new AIM technologies by diverse suppliers, spread the costs of developing or negotiating for the rights to use AIM technology, modify the design of their table saws to incorporate the AIM technology, and retool their factories for production. However, almost certainly, a later effective date would also delay the ubiquitous availability of table saws with AIM technology into the market. Because we anticipate that a longer period will not be necessary for commercial availability of AIM technologies from diverse suppliers, the Commission finds that a 36-month effective date from the issuance of a final rule is an appropriate length of time.

(3) *Exempt contractor and cabinet saws, or industrial saws, from a product safety rule.* The Commission considered whether to exempt certain types of saws commonly used by professional, commercial, or industrial users, based on their size, weight, power, or electrical specifications. Based on the severity of injuries and recurring hazard patterns of blade-contact injuries, coupled with the high societal costs of these injuries, though, a performance requirement is necessary to reduce the unreasonable risk of blade-contact injuries on all table saws. Moreover, there is no clear dividing line between consumer and professional saws.

(4) *Limit the applicability of the rule to some, but not all, table saws.* The Commission considered limiting the scope of the rule to a subset of table saws to allow manufacturers to produce both table saw models with AIM technology, and models without AIM technology. However, based on the severity of injuries and recurring hazard patterns of blade-contact injuries, coupled with the high societal costs of these injuries, the Commission finds that a performance requirement is necessary to reduce the unreasonable risk of blade-contact injuries on all table saws.

(5) *Information and education campaign*. The Commission considered whether to conduct an information and education campaign informing consumers about the dangers of blade-contact hazards, and the benefits of AIM technology. Although such a campaign could help inform consumers, without a performance requirement this approach would not be sufficient to address the unreasonable risk of blade-contact injuries on table saws.

Alberta E. Mills,

Secretary, Consumer Product Safety Commission.

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